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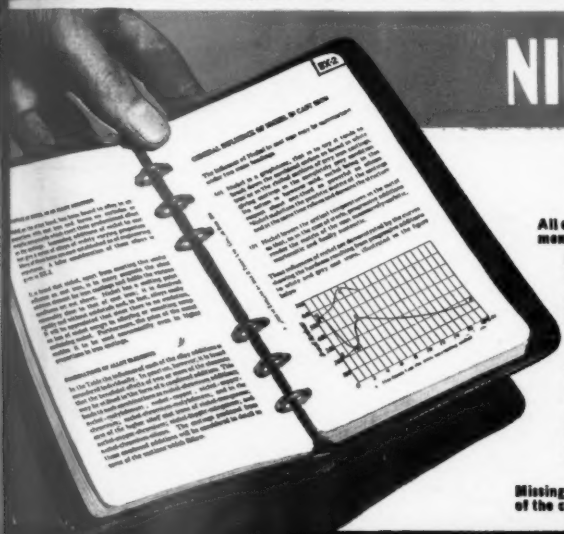

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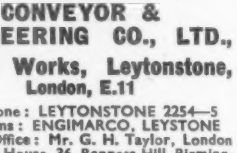

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FOUNDRY TRADE JOURNAL
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Industrial Health

We have just been reading the Report of Proceedings of the Conference on Industrial Health which was held a few months ago in London. It is not very interesting as there was far too much verbosity associated with arguing from the particular to the general. Moreover, being, we take it, a verbatim report, a lack of dignity is too often evident. There were several references to the existence of a committee for studying the alleged existence in steelfoundries of pneumoconiosis, or silicosis as it has been called until just recently. It is an unfavourable moment for drawing conclusions on this matter because the disease-resisting power is probably lower than normal, whilst because of black-out and extra production per unit floor space, the dust problem is accentuated. Brigadier-General Baylay, whose interest in foundry practice is both sincere and profound, pointed out how the industry was taking steps to reduce the hazard by replacing sand-blasting with shot-blasting, by using machines employing centrifugally-thrown shot, and the newly-introduced wet sand blast process. Much of the discussion was useless because everybody realising the existence of the dual nature of the problem, failed to find a solution as applied to the smaller works. As for the larger establishments, the integrity of the medical officer was apparently not yet quite accepted by the employees, because his salary was paid by the management. Many references were made as to the desirability of the works medical officer familiarising himself with all the processes carried out in order that he could prevent or at least minimise occupational diseases, much as the welfare superintendent or the safety-first officer does with industrial accidents.

To our mind the most interesting contribution was made by Captain W. P. Knowles, who related how an entirely new system of breathing exercises produced both fitness and eliminated fear and worry. He stressed how this was being used in the fighting services with remarkably good effect. He did not detail the system and nobody apparently thought it of sufficient practical interest to raise a query, as with the exception of members of the medical profession present, the rest were more intent on platitudinous observations. Those of us who have participated in the work of educational committees well know how everybody has good ideas, but finds that the difficulties of convincing all the various interests are insuperable. The Conference on Industrial Health evinced a similar outlook, as the co-operation of all parties requires marshalling around a fixed plan, the nature of which is nebulous, but was by general consensus of opinion not merely desirable but an integral part of the Government's post-war policy. Moreover, whatever is done cannot stand alone but must be integrated with the whole scheme of public health services. The best indirect contribution to this discussion has been made since the Conference was held, through the publication by the Nuffield College of a pamphlet on the "Regional Basis for Health Reform." This Report has been prepared by Sir Arthur MacNalty and the first recommendation he makes is that the Minister of Health's appointment should be non-political and that he should remain in office for a period of sufficient length so that a consistent policy could be followed. This seems sensible for, to our mind, it is best to organise the whole field of national health before legislating widely for the part embracing occupational diseases and their amelioration.

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CORRESPONDENCE

A MATTER OF CREDIT

To the Editor of THE FOUNDRY TRADE JOURNAL.

SIR,—In reading the Paper entitled "Fluid Pressure in Foundry Practice," by Mr. E. Longden, and presented before the Lancashire Branch of the Institute of British Foundrymen, it occurred to me that a somewhat incorrect impression may be drawn as to the small matter of credit for the initial work on this subject carried out in the United States, and as I had the honour to be Chairman of the meeting at which Taylor and Rominski presented their Paper entitled "Atmospheric Pressure and the Steel Casting," and have also the advantage of friendship with all the parties concerned, and a very intimate knowledge of the circumstances of their work, I would like to emphasise one or two points relative to the credit for this particular foundry technique.

The excellent Paper submitted by Taylor and Rominski was undoubtedly presented in order to give to foundrymen, through the agency of the American Foundrymen's Association, a complete description supported by experimental data, with a view to their developing a better understanding of the practical use of the method, and the authors went to great pains in the chapter of their Paper headed "Historical" to insure that the credit for the initial idea went to the correct quarters.

Knowing the authors as I do, I know that they will welcome my drawing your attention to the fact that the sketches on page 49 of the FOUNDRY TRADE JOURNAL of May 20, 1943, have beneath them a caption referring to the Taylor and Rominski method, and although we are probably all too busy to attach much importance to personal credit, yet I feel that in order to keep the records straight it would be as well to point out that this method was a definite outcome of work by Mr. H. D. Phillips, and Mr. John Williams, of the Dodge Steel Company, Philadelphia, and that a patent for the use of the core in this head has been issued to the last-named gentleman. Many of our American foundries, including ourselves, are operating under working licences in the use of this method, and have done so for several years.

No one in the American steel casting industry appreciates the work of the Naval Research Laboratory on behalf of the steel casting industry more than I do myself, and for some years we have all looked forward to the publication of their succession of Papers, knowing that they would be models of helpfulness and scientifically evolved facts. But I feel sure that the authors of this particular Paper would appreciate Mr. Longden's attention being drawn to their very obvious effort to credit the originators of the technique, rather than to refer to it as the Taylor and Rominski method.

I would like to add that the development of this technique and clarification and demonstration by Taylor and Rominski have resulted in its being adopted by a very large number of steel foundries in this country, and can assure interested steel founders that given care in its application and a rigid adherence to dimensional relationships the results are excellent, and exactly as described. It has been a definite acquisition to the obtaining of sounder, and at the same time cleaner, steel castings.—Yours, etc.,

FREDERICK A. MELMOTH
(Vice-President, The Detroit Steel Casting Company, Detroit, Michigan).

June 15, 1943.

[We were not surprised to receive Mr. Melmoth's letter, as we have noticed that ever since the disclosure of the system foundrymen started to refer to it as the Rominski or Rominski and Taylor method. This no doubt is due to a desire on the part of foundrymen to refer their listeners to the source where the information is to be found. This mental attitude will now be difficult to change. There is an exact parallel with the pencil runner system. The late Mr. Ronceray opened each lecture by stating the name of the inventor, yet in the discussion which followed people immediately referred to it as the Ronceray system. However, we will do our best to direct public utterances on the subject into the proper channel.—EDITOR.]

NOTES FROM THE BRANCHES

London Branch, East Anglian Section.—The opening meeting of the summer session was held in Ipswich on June 19. Mr. C. J. Lake presided until he had inducted Mr. F. E. Tibbenham, the new president, into the chair. After a short address dealing with local matters, Mr. W. Gladwell repeated his lecture on "Radiography as an Aid to Foundry Technique." A lively discussion took place, wherein the author described the use of a conveyor belt for mass inspection. This could be tilted, whilst the angle of the screen could be so manipulated so that all the castings could be radiographed. Other questions related to the cost of the apparatus, and the individual radiograph: the care of the radium used; the types of the flaws depicted, and the use of radiography for iron and steel castings. Mr. C. H. Kain, in proposing a vote of thanks, stressed that the notion of "permissable flaws" should be discouraged, and he felt that radiography would help towards it with the production of 100 per cent. of sound castings.

CONFERENCE PAPERS

In view of the various difficulties which prevented early distribution of the preprints of the Technical Papers presented to the recent Annual Conference of the Institute of British Foundrymen, as a result of which the discussions were somewhat curtailed, members who desire to make further contributions to the discussions are reminded that such can still be made in writing to the Institute, Saint John Street Chambers, Deansgate, Manchester, 3, and will be considered by the authors. Such contributions should reach the Acting Secretary of the Institute not later than July 31 next.

THE SPECTROGRAPHIC ANALYSIS OF CAST IRON

By F. B. LING, J. McPHEAT (Associate Member) and J. ARNOTT, F.I.C. (Member)

Paper read before the Annual Conference of the Institute of British Foundrymen

The industrial spectrograph finds its greatest application in the routine analysis of steels, aluminium alloys and brasses. The equipment at Cathcart was not purchased primarily for any one of these uses, but as a general purpose tool, with the expectation that it would serve for some difficult estimations in nickel alloys. It might be added that several of the latter have since been handled with satisfactory results. Shortly after the spectrograph was installed, it was considered that it would help to build up general experience if the method could be used for a period on samples which were being analysed daily by chemical means. At the time the most readily available were cast irons.

The most of the work was done some considerable time ago, but the original programme was not completed because some more immediately urgent work had to be undertaken. In recent months several firms have become interested in the subject, and since little work on cast iron appears to have been done, or at any rate published, in this country, the authors

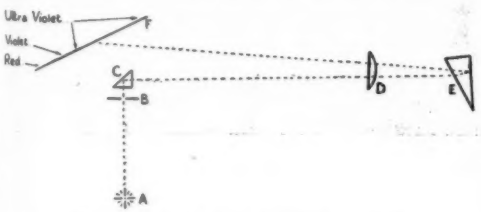


FIG. 1.—LARGE QUARTZ SPECTROGRAPH, OPTICAL TRAIN.

felt that it might be of some small service to give the results obtained, even though the range of alloying elements is rather narrow.

General Description

It is probable that the whole matter may be new to some of the members; hence it might be useful to give a very brief description of the apparatus and the method of use.

The industrial spectrograph covers a wave band of 2,000 to 8,000 A.* Alloys of the ferrous group give a spectrum containing so many lines that maximum dispersion is essential; hence the largest size instrument is necessary. The work to be described was done on a large-size Hilger quartz spectrograph. In this instrument, the band of 2,000 to 8,000 A. would give a spectrum of 30 in. long. A photographic plate of this length is impracticable, and the instrument is therefore so designed that the complete spectrum can be photographed in three sections of 10 in. Any 10 in. of the 30 in. can be utilised; throughout this investigation a band of 2,700 to 4,300 A. was used.

The essential features of the spectrograph itself are shown in Fig. 1. The light from the sample (A) is passed through the slit (B) and is reflected by the

FIG. 2.—EXPOSURE OF PLATE.

right-angled prism (C) to the collimating lens (D). It is then reflected by a 30-deg. Littrow prism (E). The back of this prism is a mirror which reflects the light back through the collimator. The latter now acts as a camera lens to the photographic plate (F). It will be readily understood that since the work is in the ultra-violet region the lenses and prisms must be made of quartz.

Slit Width.—The function of the slit is to control the width of the lines which appear on the spectra; in the authors' work a slit of fixed width, 0.015 mm. is employed.

Excitation.—The light is produced by a high tension discharge between the sample and a graphite electrode.

* A=Angström Unit=10^{-8} cm.

Spectrographic Analysis of Cast Iron

Plate.—The plate used is 10 in. by 4 in., and the type of emulsion is not widely different from that used in ordinary photography. Many spectra can be taken on one plate because they need only be a few millimetres in height. In the work to be described, a slit height of 2.5 mm. was employed throughout. This allows up to 24 separate exposures to be taken on one plate.

Operation of Spectrograph

The manipulative side of the whole method is best shown by the three photographs in Figs. 2, 3 and 4. Fig. 2 shows the exposure of the plate; the spark seen at the right-hand side is being produced by a H.T. discharge between the sample which is below and the graphite electrode above. Fig. 3 indicates how the visual comparison and recognition of the line is made in the "Judd-Lewis" comparator. In this instrument any plate can be easily compared with a standard plate bearing spectra from alloys containing all the elements under consideration, or even from composites of the various pure metals or ferro-alloys in the powdered state. The standard plate is not used quantitatively; it is only utilised to spot the important lines of the elements. Fig. 4 illustrates the measurement of line intensities in the micro-photometer.

The spectrograph requires solid specimens (not borings), and these may be of any reasonable size and shape, but preferably about 1 cub. in. A piece of 1.2 in. dia. test-bar is ideal.

Quantitative Estimation

In very simple language, the mechanism of quantitative estimation by means of the spectrograph is as follows:—The spectrograph splits up composite light from the spark, giving series of lines on the photographic plate. Each element present gives lines of definite and known wavelengths. By reference to wavelength maps it can be quickly determined if any one element is present.

It has been found by earlier workers that the percentage of any one element, say manganese in cast iron, is determinable by the internal comparison method. This is simply the measurement of the blackness of any one line of the element compared with that of a chosen line of the major element within the same spectrum. In cast iron the major element is, of course, iron. It may come as a surprise to some that most elements give many lines. Iron is profuse in this respect, giving about 10,000 lines within the range of this spectrograph.

The first step towards quantitative spectrographic analysis is the careful preparation and chemical analysis of a series of samples, say six in number, covering the complete range of the element or elements to be determined spectrographically. The chemical analyses of these samples must be of the highest possible accuracy, since the value of the spectrographic estimation is completely dependent on this. A plate is exposed with the standards on it, probably in triplicate, and the intensities of the "line pairs" measured. This term is applied to the chosen lines of the minor and major elements. The ratio, or more generally the log ratio, of these intensities is plotted against the percentage of the element, and the curve so obtained is utilised for all future samples.

It will be appreciated that all factors connected with the exposure, the plate itself and the details of development must be rigidly standardised. Many and possibly most of the discrepancies encountered are due to neglect to observe all the conditions and precautions.

FIG. 3.—"JUDD-LEWIS" COMPARATOR.

FIG. 4.—MICRO-PHOTOMETER.

Of the constituents present in cast iron, carbon, phosphorus and sulphur cannot be estimated by the methods described in this Paper. Silicon, nickel, manganese, chromium and molybdenum have been estimated within certain ranges, and there is every reason to expect, from analogy with steel manipulation, that vanadium, titanium, aluminium and traces of other accidental elements can be tackled.

Before going on to describe the experimental work it should be mentioned that the authors took as their text-book throughout Mr. Barker's Paper to the Iron and Steel Institute in 1939.

First Trials

No irons were available of compositions covering the range desired, and it was necessary to make up a suitable series. Details of the first set of standards to be prepared are given in Table I. These were all made in crucibles from the same mixture by addition of the alloying elements. The total carbon, phosphorus and sulphur were practically constant throughout at 3.3 per cent., 0.35 per cent. and 0.11 per cent. respectively.

TABLE I.—*First Set of Standards.*

Mark.	Si. Per cent.	Mn. Per cent.	Ni. Per cent.	Cr. Per cent.	Mo. Per cent.
2	1·00	0·51	—	—	—
4	0·68	0·31	0·28	0·21	0·37
5	1·28	0·62	0·43	0·42	0·38
6	1·51	0·79	0·73	0·51	0·70
7	1·68	1·01	1·10	1·05	1·04
8	1·90	1·14	1·13	1·14	1·18
9	2·32	1·30	1·45	1·06	1·37

The chemical figures were the mean of results from four analysts. The samples were cast in core sand, 1.2 in. diameter, 6 in. long after discarding the head. Each sample was cut in half. One portion was drilled down the centre for its entire length and the drillings thoroughly mixed for analysis, the other half of each was reserved for the spectrograph.

The technique for the first set of trials was on the lines of that used for steels by the Admiralty Laboratory in Glasgow University. The conditions were as follows:—

Wave band ...	2,700-4,300 A.
Slit width	0.015 mm. (fixed slit)
Spark gap ...	3 mm.
Voltage	15,000 volts.
Added inductance....	Nil.
Upper electrode ...	H.S. graphite pointed to 80° angle.
Lower electrode ...	Sample, filed flat on sparking face.
Exposure	90 secs., made up of six separate exposures of 15 secs. across face of sample, top electrode changed after three exposures.
Plate	Ilford thin film half tone.
Development ...	(*a*) 90 secs. at 19.5 deg. C., using 100 cc. standardised developer. (*b*) Fixed in acid hypo for 7 min. (*c*) Washed—running water for 15 min. (*d*) Dried—warm air from hair drier.

This gave somewhat under-exposed plates, which were not suitable for measurement.

The next set were run with:—

Exposure	2 min., made up of four separate exposures of 30 secs. each. Graphite electrode changed every 30 secs. exposure.
Development ...	2½ min. in 100 cc. standardised developer at 19.5 deg. C.

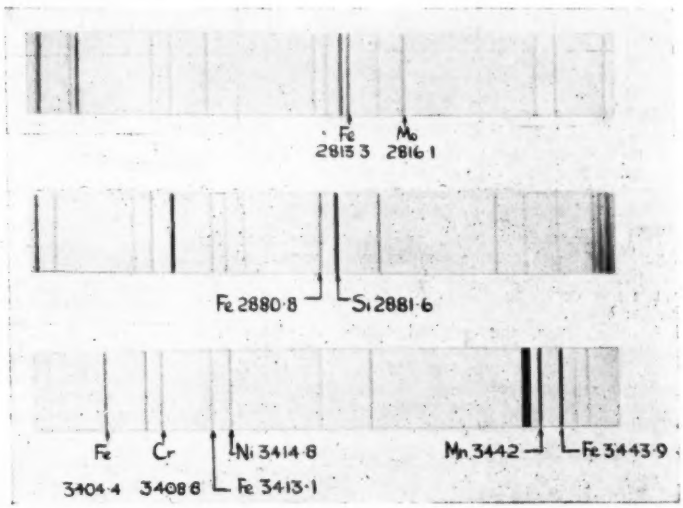


FIG. 5.—LINE PAIRS FOR ALLOY CAST IRON.

Spectrographic Analysis of Cast Iron

All the other conditions were similar to the first. The standard samples were exposed in duplicate (plate F.21), and from this plate a set of curves was prepared, using the following line pairs:—

Silicon ...	...	2,881.6 A. with iron 2,880.8 A.
Manganese	...	3,442.0 A. with iron 3,443.9 A.
Nickel ...	...	3,414.8 A. with iron 3,413.1 A.
Chromium	...	3,408.8 A. with iron 3,404.4 A.
Molybdenum	...	2,816.1 A. with iron 2,813.3 A.

The significance of line pairs can be better appreciated by reference to Fig. 5, which is a series of enlargements of portions of an alloy cast-iron spectrum. The curves are reproduced in Fig. 6. These curves were mainly good, and they were used for a period to check routine samples which were analysed chemically. Over this period agreement was tolerable, but a few eccentric figures for manganese called for further work.

At this stage, the original batch of plates was exhausted. New curves were drawn for the next batch of the same type, and it was found that the new curves were so similar to the original that no serious error would have been caused by using the old curves for the new plates.

Second Set of Standards

After some further work it was realised that the composition of the first series of standards had not been well chosen. Some were difficult to drill for chemical analysis, and furthermore the progressive increase in all the added elements resulted in considerable differences in the iron content. These, it was thought, might affect the density of the lines of the major element. It was resolved to make a new series and to limit the range to that required for the routine examination of samples as then received from the foundry. Details of the second set of standard samples prepared are given in Table II.

In the second set of standards, Cr and Mo were not included because iron with these elements was seldom received in the laboratory, and also because the original curves from plate F.21 were so satisfactory that new curves could be readily made at any time, using the same line pairs, if the need arose.

At this time, Zenith H. & D. 700 plates were being used for arc spectra of non-ferrous alloys, and since the number of routine cast-iron samples was small, it was decided to see if a compromise could be effected to save plates and processing time. Ilford ordinary plates were chosen, and this choice was endorsed by work done by Hilger, Limited, on some samples of cast iron which had been sent for manganese estimation. Hilger, Limited, obtained very good results,

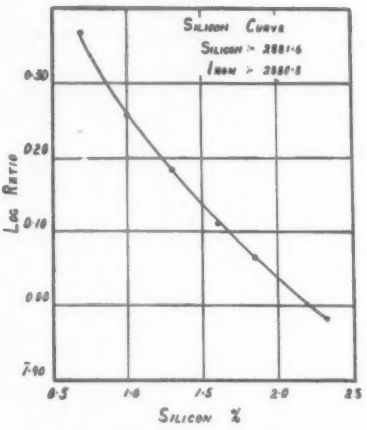


Fig. 6A.—Silicon Curve.

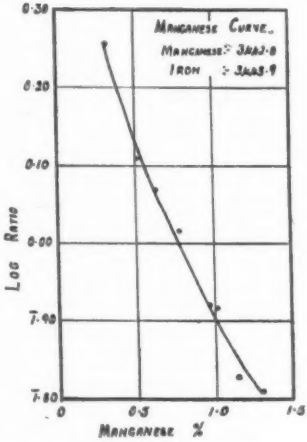


Fig. 6B.—Manganese Curve.

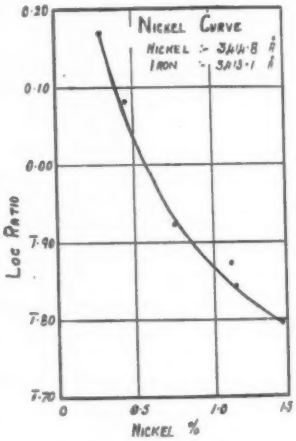


Fig. 6C.—Nickel Curve.

Table II.—*Second Set of Standards.*

Mark.	Si. Per cent.	Mn. Per cent.	Ni. Per cent.
A.1	0·95	0·48	1·72
A.2	1·15	0·69	1·03
A.3	1·37	0·81	1·13
A.4	1·65	0·94	0·60
A 5	1·94	1·03	0·30

using Ilford ordinary plates. The conditions they used were:—

Wave band ...	2,700-4,300 A.
Slit width	0.015 mm.
Spark gap ...	3 mm.
Voltage	15,000 volts.
Added inductance....	Nil.
Upper electrode ...	H.S. graphite pointed 80° angle.
Lower electrode ...	Sample filed flat.
Exposure	Single spark, 30 secs.
Plate	Ilford ordinary.
Development ...	2 min. at 19.5 deg. C.

The standard samples were exposed in triplicate under these conditions. The plate was measured for silicon, manganese and nickel, using the same line pairs as formerly. While the silicon and nickel curves were very promising, the manganese results were bad and no consistency could be observed. The silicon curve was used for checking some routine samples, but agreement was not very good; the difference amounted to as much as 0.10 per cent. silicon in samples containing about 1.5 per cent.

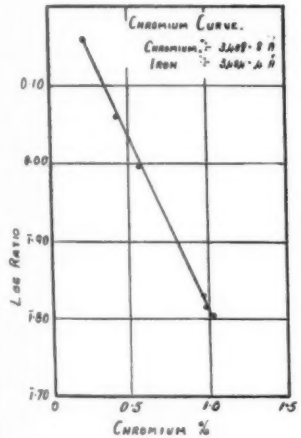


FIG. 6D.—CHROMIUM CURVE.

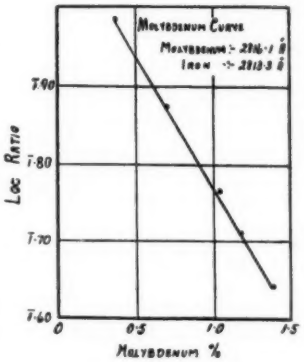


FIG. 6E.—MOLYBDENUM CURVE.

From the outset it had been recognised that the silicon estimation was one which would present the greatest difficulty. Unfortunately, silicon has only one line (2,881 A.), in the portion of the spectrum generally used for iron and steel analyses. This line is so strong that it is used for the estimation of silicon in steel down to percentages of the order of 0.02 per cent. At figures of 1 to 3 per cent., therefore, it is a very intense line, and the problem resolves itself into one of obtaining a silicon line of penetrable density, with exposures which will give adequate density in the lines of other elements down to the low limit of their possible presence.

After this, it was decided to investigate pre-sparking for a period of ten seconds before the exposure of thirty seconds, with all the other conditions the same as those mentioned above. A plate was taken and measured for silicon and manganese (F.81). The pre-sparking period had clearly benefited the manganese result, while the silicon line was also fairly satisfactory. After consideration of the various points brought out by this trial, it was decided to reduce the exposure time and also to increase the pre-sparking time. It was hoped that the intensity of the silicon line would be decreased and that further improvement in the manganese line might result. This was done with the following altered conditions:—

Pre-spark	15 secs.
Exposure	25 secs. (single spark)
Plate	Ordinary;

all other conditions as before.

This plate gave promising results for silicon, manganese and nickel. The manganese showed increased reproducibility. After consideration of the graphs it was thought that the one for silicon might be improved by trying some other iron line for comparison. This silicon graph showed an almost straight line between 1.0 and 1.4 per cent. silicon. Thereafter, it developed a curve between 1.4 and 2.0 per cent. silicon. Further, the point at which the silicon and iron lines were equal in intensity was too far removed from the part of the graph covering most of the work. With these matters in view, various other iron lines were measured against the usual silicon line, but it was found that the shape of the curve was practically independent of the iron line. The only thing left, therefore, was to experiment further with the conditions, and a series of exposures was made with changes in the added inductance of the spark circuit. It was found that 0.06 mH, which was the lowest amount available, gave the most promising figures. A set of standards was then exposed under the following conditions:—

Spark gap	3 mm.
Added inductance	0.06 mH.
Pre-spark	10 secs.
Exposure	40 secs. (single spark)
Plate	Ordinary;

all other conditions as before.

This plate was measured for silicon, manganese and nickel. Good log ratios were obtained, agreement being within 0.010 of the average. The graphs prepared from this plate gave smooth curves. The silicon curve was used to check routine samples over a short period.

Spectrographic Analysis of Cast Iron

When the results were reviewed, it was found that roughly 40 per cent. showed a disagreement between chemical and spectro of over 4 per cent., and it seemed probable that there had been some want of care in some of the smaller details. On investigation of the alignment of the light source, it was established that errors up to ± 0.08 per cent. silicon were possible through incorrect alignment of the electrodes in both the horizontal and vertical planes.

The other sources of error were connected with the temperature and quantity of developer. It was found that the volume of developer had an effect on the density of the plate; hence any accidental spilling would alter the density. This effect was lessened by increasing the volume of developer used.

It was realised that insufficient attention had been paid to temperature. The dark room temperature was frequently higher than 20 deg. C. and a rise of 1 deg.C. of the developer was possible during the time of development. From this investigation it was decided to standardise development in future to 150-c.c. developer and 20 deg. C., using a thermometer reading to 0.1 deg. C.

Final Conditions

As a result of many experiments, the best conditions were found to be as follow (Plate F.101):—

Wave band	...	2,700 to 4,300 A.
Slit width ...	...	0.015 mm. (fixed slit).
Spark gap ...	...	3 mm.
Voltage ...	...	15,000 volts.
Added inductance		0.06 mH.
Upper electrode	...	H.S. graphite sharpened to 80° angle.
Lower electrode	...	Cast-iron sample—flat face.
Pre-spark ...	...	10 secs.
Exposure ...	...	30 secs. (single spark)
Plate ...	...	Ilford ordinary.
Development:	...	(1) Standardised developer, 150 c.c. for 2 min. at 20 deg. C. (2) Fixed acid hypo for 7 min. (3) Washed—running water, 15 min. (4) Dried in current of warm air.

Plate F.101, taken under these conditions gave the curves illustrated in Fig. 7. The curves were all satisfactory and in later work no further change in conditions was found necessary. Subsequent exposures of routine samples and the standards under these conditions gave results which agreed within the usual analytical tolerance with the chemical figures.

Assessment of Utility

The place of spectrographic work in cast-iron analyses must in all cases be affected by the type of iron to be tested, the number of samples to be handled, the need or otherwise for speed, and the specific alloying elements to be estimated.

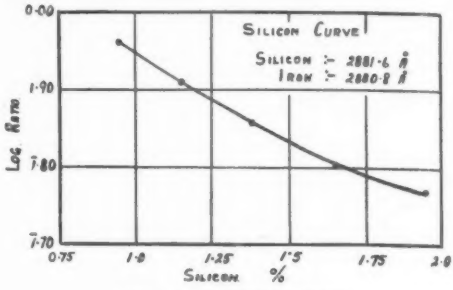


Fig. 7A.—Silicon Curve.

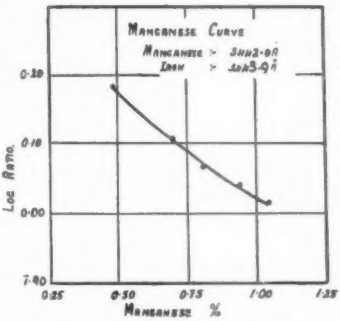


Fig. 7B.—Manganese Curve.

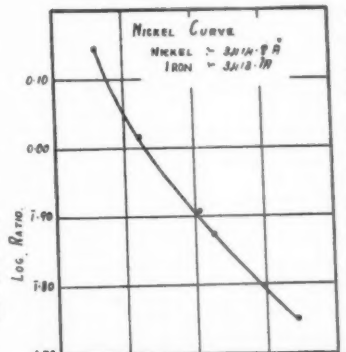


Fig. 7C.—Nickel Curve.

When this investigation was commenced, spectrographic analysis was the only alternative to purely chemical methods. Since then, however, the Spekker Absorptiometer has come into prominence, and it undoubtedly provides excellent methods for the estimation of elements which directly or indirectly give coloured solutions. The estimation of manganese, for example, is delightfully speedy and accurate. It can be safely assumed that both spectrographic and absorptiometric methods will be intensely developed in the near future and any attempt at appraisal of their relative suitability can only be taken as applying to to-day's date.

(*Concluded on page 240.*)

RECOMMENDED PROCEDURE FOR THE IMPACT TEST FOR CAST IRON

Early in the war it was realised that more information was required by the Service Departments on the toughness and impact strength of modern high-duty cast iron. This information is, of course, essential in considering both the replacement of other materials, such as steel and non-ferrous alloys, by cast iron in service components, and also in judging the suitability of iron castings for duty under conditions of shock likely to be encountered in modern warfare.

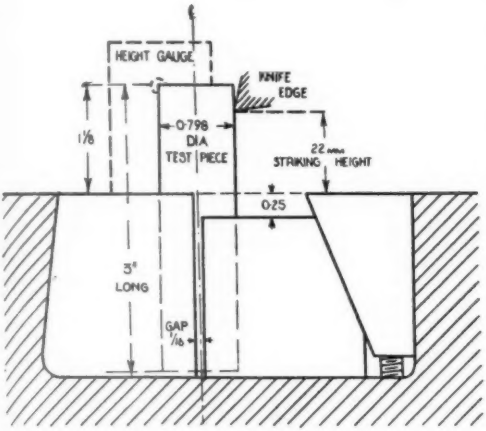


FIG. 1.—ARRANGEMENT OF TEST-PIECE IN IZOD IMPACT MACHINE.

A Sub-Committee of the Technical Advisory Panel to the Directors for Iron Castings of the Ministry of Supply was, therefore, set up to study methods of impact testing and to endeavour to develop a standard procedure for carrying out the test with a view possibly to ultimate standardisation of a test for use in industry and by the Services generally.

The Sub-Committee has been engaged for a considerable time in the study of existing methods developed for the impact testing of cast iron, and has carried out a great deal of experimental work in co-operation with industry with a view to developing a simple and satisfactory test which would be generally acceptable. The Sub-Committee is not yet in a position to recommend the standardisation and specification of an impact test, but they are able as a result of their work to recommend a procedure to be adopted in making the impact test of cast iron.

The object of this note is to bring this *recommended procedure* to the notice of those who are interested, and it is the Sub-Committee's desire that all those in industry and in the service departments who are concerned with the impact testing of cast iron should adopt this recommended procedure as set out below. The Sub-Committee invite the co-operation of all concerned with the object of collecting as much data and experience as possible to enable them to give further consideration to this test in the hope that it might be possible for them ultimately to make recommendations for its standardisation and specification.

After considering all available methods, the Sub-Committee felt that the most generally useful test would be a single blow test, and carried out in the Izod impact test machine owing to the availability of this type of equipment in many engineering works, and its acceptance as a standard method of test on other materials. As detailed below, however, a special form of test-bar is necessary in order to give a wide spread of results with adequate differentiation between different classes of cast iron. The 10-mm. square bar as used for the Izod test for steel is clearly unsuitable, as the test figures generally lie between ¼ and 4 ft.-lbs.; with the test as proposed, the range of results is widened to between 5 and 70 ft.-lbs. for modern grey-iron castings. It must be emphasised at the outset that the test is designed primarily for plain and alloyed grey cast iron and is not suitable either for malleable cast iron or for the special highly alloyed irons of the austenitic types.

Details of Procedure

The procedure recommended for the impact test is as follows:—

(1) The impact test should be carried out in the standard 120 ft.-lb. Izod impact machine.

(2) The form of test-piece to be a 0.798-in. dia. plain bar, with no notch or groove. A separate test-piece to be employed for each test.

(3) The test-piece to be held in grips or dies in accordance with Fig. 1 herewith. This, it may be noted, is, with minor modifications, in line with the practice developed and recommended by the British Cast Iron Research Association following their own study of this problem.

(4) A striking height of 22 mm. to be employed, this height to be measured from the top of the rear grip, as indicated in Fig. 1.

(5) Special attention must be given to the fit of the grips in the machine and the fit of the specimens in the grips. This calls for care in finishing the specimen accurately to diameter.

(6) Wherever possible, at least three tests on any one material should be taken and averaged.

(7) Test-pieces may conveniently be machined from the 1.2 in. dia. by 21 in. long transverse test-bar, or, alternatively, from the broken halves of this bar after transverse testing. In taking test-pieces, clearly the top end of vertically cast bars should, if possible, be avoided.

A number of machines are known already to be equipped with the necessary grips. Firms with tool-room facilities will no doubt be able to prepare their own grips to fit Izod machines available, but in cases

(*Continued on page* 246.)

THE SPECTROGRAPHIC ANALYSIS OF CAST IRON

(*Concluded from page* 238.)

Advantages and Limitations of Spectrographic Analysis

The advantages of spectrographic methods as applied to cast iron might be stated as:—

(1) *Speed and Reduction of Labour.*—Once the conditions are established, routine samples can be run through quickly, taking spectrograms of, say, a dozen samples in duplicate on each plate. Each sample may contain five elements which are to be estimated. The preparation, exposure, development, etc., are the same no matter how many elements are to be estimated; the only difference is the few additional minutes at the microphotometer.

As a rough idea of the overall time involved, a single operator averaged 2½ hrs. for nine samples of cast iron. In these silicon, manganese and nickel were estimated in duplicate. This gives a time for each duplicate estimation of under six minutes. This was done without any attempt to cut the time to the minimum, and the allocations for some of the operations were very generous. With two operators the time can be very much reduced. Apart from capital costs, the only outlay is that for plates and developer. With twelve samples on a plate, the cost per sample is under 2d.

(2) *Sample Easily Prepared.*—There is no need to drill; hence the hardness of the sample does not matter.

(3) *A Permanent Record is Obtained.*—At any time, a plate may be looked out and measured for some element not originally checked.

The disadvantages or limitations cover the following:—

(1) The method can only be applied to the estimation of elements whose log-ratio curves have been determined. For maximum accuracy, the curves should have been determined from standards of roughly the same type as those to be examined.

(2) There is a distinct top limit to the amount of an element which can be determined. These limits have not been explored, but it is doubtful if silicon in excess of 3 per cent. can be estimated with reasonable accuracy.

(3) The area which is sparked is so small that unsatisfactory results are obtained from non-homogeneous samples. If the homogeneity of the samples is in doubt, recourse must be made to the composite spark method.

(4) The method, as at present practised, is not applicable to drillings.

The authors wish to record their appreciation of the help received from Mr. Barker, of the Bragg Laboratory, and from Messrs. Cross and Goodall, of the Admiralty staff. In conclusion, the authors' thanks are due to the directors of Messrs. G. & J. Weir, Limited, Cathcart, for their interest and encouragement in the work and for permission to publish this Paper.

BOOK REVIEWS

Foundry Sand Control. By Harry W. Dietert. Published by the Great Lakes Foundry Sand Company, United Artists Building, Detroit, Michigan. (Price $4.00.)

The book has been prepared by H. W. Dietert and much of the information given has been taken from Papers he has published, but its collection into such a concise whole does not appear to have been attempted before. The first part consists of an analysis of defects due to moulding sand or to the way in which it is used, the defects, together with their causes and the appropriate remedial action to be taken, being set out in a chart which is later amplified. The second and largest section describes the effect of variations in clay content, grain size, mould hardness and coal dust on the properties of moulding sand, and includes an account of the factors which control strength at high temperatures and volume changes on heating. This grouping is unusual, but permits the inclusion of practically all the important points, with particular emphasis on those which have only recently been investigated, with a minimum of repetition. A suggested programme for routine sand control is also included. Although the book has been compressed into very small compass, graphical representation of results helping greatly in this direction, there is no difficulty in finding any particular point required, and the whole is a very useful reference book for the practical foundryman.

J. O.

Spot-tests for the Identification of Certain Metallic Coatings and of Certain Metals in Bulk. By B. S. Evans and D. G. Higgs. Published by W. Heffer & Sons, Limited, Cambridge. Price 3s. 6d.

The authors might with advantage have chosen a more snappy title for this exceptionally useful and interesting booklet. It had its origin no doubt in the fact that the material formed a Report from the Armaments Research Department. The reviewer, because of other fields of interest, raises the question of colour nomenclature. Experience has shown that no two people handling a wide range of colours and shades will agree as to their description, and it is hoped that there has been a consensus of opinion. Fortunately the descriptions are amplified by modes of formation which should be helpful. "Pink" appears very frequently, yet to some people this colour may be anything from a dull red to a bright scarlet, whilst to others the violet to mauve and blue ranges are equally difficult. The matter is largely compressed into a series of tables, and these render the booklet an invaluable text book on the subject.

At Leopoldville, Belgian Congo, Enterprises Industrielles have recently started working a number of iron, steel and bronze foundries, equipped with electric furnaces, to cover local demand.

FUEL CONSERVATION IN IRON-FOUNDRIES

DISCUSSION MEETING OF EAST MIDLANDS REGIONAL PANEL OF THE IRONFOUNDING INDUSTRY FUEL COMMITTEE

Exchange of views initiated by Mr. McRae Smith's Review of Recent Methods of Saving Fuel

A technical discussion on "Fuel Conservation in Ironfoundries" was held at the Guildhall, Derby, recently. Mr. A. E. Peace, chairman, opened the meeting by explaining the position of the East Midlands Regional Panel in the Ministry of Fuel and Power organisation, and also the work and personnel of the Panel. After his Worship the Mayor of Derby had addressed a welcome to the audience, Mr. A. E. McRae Smith, M.A., gave a résumé of the most recent methods which had been established for the conservation of fuel in the ironfounding industry.

The discussion was opened by MR. S. H. RUSSELL, of Leicester, who said it was easy to organise a series of tests on the height of the coke bed, starting at a safe maximum, and reducing by 3 in. per day until the minimum was established. This done, an easy check was to note the time interval at which the metal appeared at the spout after the blast was put on. This time would vary between a minimum of 7 min. to a maximum of 15 min.

Many foundries had not the data to establish a ratio of coke used to metal melted, but all should have sufficient data to check the coke used to produce a tonnage of finished castings, and this figure, if checked monthly, would be an indication if waste was occurring. Mr. Russell has worked out the figures given by Mr. McRae Smith of the quantity of coke which should be used per ton of iron melted, and his experience confirmed those figures. He had two cupolas of similar size and design working in different foundries, one foundry produced small castings entirely, seldom weighing as much as 1 cwt., the other foundry rarely cast a job weighing under 5 cwts. Owing to the facility for removing the metal from the foundry cupola melting for the heavy castings, the rate per hour was considerably higher than the cupola melting for the light castings, and it was difficult to lay down any standard for rate of melting.

Wood was not as readily obtained as is suggested by Mr. McRae Smith's Paper, and for many years a torch burning crude oil, and under 30 lbs. per sq. in. air pressure, had been used to ignite the cupolas, the flame blowing straight on to the cupola coke, and neither wood nor gas coke was used.

Device for Blowing Up Cupola Fire

One of his foremen had developed a device illustrated in Fig. 1 for blowing up the cupola fire when the coke was ignited. This was found to be very satisfactory, and the method was developed also for ladle drying. A small fire was put at the bottom of a ladle, and by hanging the blower over the ladle and directing the blast downwards, a hot fire was obtained and the ladle quickly dried. The fire was then tipped into another ladle and the process was repeated. There was no doubt that all stoves used, either for core or for mould drying, should be operated under some system employing forced draft, otherwise steam hung about in the stoves and the contents stewed instead of drying.

Mr. Russell deplored the use of a permanent blackout in foundries, or in works of any kind, and said that where such existed, in his opinion it would still pay to fix shutters or other contrivances, so that the utmost use could be made of daylight. He also emphasised the great loss of power through leakage in compressed-air circuits. Compressed air was probably the most expensive form of power, and its use should be limited to essential purposes, and care given to the maintenance of the equipment in an efficient condition.

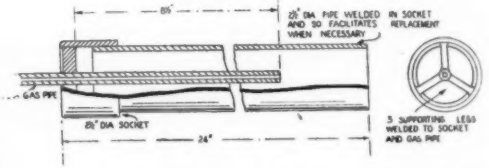

2½" DIA. PIPE WELDED IN SOCKET AND SO FACILITATES REPLACEMENT WHEN NECESSARY
GAS PIPE
2½" DIA SOCKET
24"
3 SUPPORTING LEGS WELDED TO SOCKET AND GAS PIPE

FIG. 1.—DIAGRAMMATIC SKETCH SHOWING AIR BLOWER.

MR. W. T. EVANS agreed entirely with Mr. McRae Smith, and said he was representing the malleable industry, his firm using 1,000 tons of coal per week. He remarked on the deterioration in the quality of the fuel, saying that the ash content was double what it was previously; therefore there was much more sulphur. Mr. Evans said that in the malleable industry this is a very serious matter, as a good class of fuel was relied upon both for melting and annealing.

The deterioration in quality was also pronounced in the case of coke received from the Gas Company, much of which was so friable as to be useless. He felt that the coal should be of a much better quality, and considered he had a definite cause for complaint. His firm pulverised the bulk of their coal supplies, and the harder the coal, the more power was needed to grind it, so that suitable quality was essential. Mr. Evans endorsed the previous remarks concerning compressed air, and said that it was erroneously regarded as cheap and therefore was usually one of the most frequent sources of wastefulness in foundries.

Fuel Conservation in Ironfoundries

Air Measurement in the Cupola

MR. R. D. LAWRIE considered the measurement of air in the cupola was a most vital point. He had seen smoke and flames coming from cupolas, and he considered there should be a few standard rules laid down, particularly with regard to air requirements. It was very wasteful to burn the carbon to CO. Mr. Lawrie said that during his travels he had been appalled by the lack of instruments for measurement of air in the cupola, and he said that 50 per cent. of the cupolas in the country had no such gauges. He would like Mr. McRae Smith to enlarge on this.

Mr. Lawrie then referred to the size of the well which should be determined by the class of metal being melted. He had often found an extremely variable burden being melted with an insufficient size of well to produce uniformity of composition from tap to tap. Regarding mould drying, he had been surprised to find up-to-date firms with well-built stoves containing efficient dryer furnaces similar to the one described in the Paper, but with no outlet flues. In connection with dry sand *v.* green sand, he thought that more people are now turning to dry-sand moulding, due to the reduced skill of the labour available. If there was a proper sand preparation system in the works, then, of course, green sand could be satisfactorily controlled. Regarding ladle drying, Mr. Lawrie said he considered it more economical to brick the ladles, although the initial cost was higher.

He then remarked on coke ash for venting. In his travels, he has been in charge of several foundries, large and small, and had found that in some foundries one would get the sack for putting coke into the mould for venting, and in others that was all they used. He thought that it was very difficult to separate the coke ash from the sand the next day, and this no doubt accounted for many people using coke for venting.

MR. P. A. RUSSELL, B.SC., said he was not thoroughly familiar with the recirculation of air in stoves, and would like to know if it was mechanical circulation or how it was carried out. There appeared to be a lot of talk about the control of cupolas, the height of the bed, etc., but one very rarely heard anything about the cupolas towards the end of its blow. What economies were possible in blowing down the cupola? Were there any specific methods? There was frequently not only a wastage in quality of metal, but a further wastage in burning of the lining.

Economy and Efficiency

MR. RAYMOND EVERSHED, K.C., the Regional Fuel Controller, said he would like to stress that, if there must be economy, there must be efficiency, too. He had listened with very great interest to Mr. McRae Smith's address, and also to the questions, particularly the one regarding the deterioration of coal. He expressed his appreciation of the way the foundries in the area were practising efficiency and economy, and he congratulated the members of the Panel on their public spirit and enterprise in forming such a committee to investigate this subject of fuel conservation.

Although he admitted he was greatly criticised by both sides of the industry, so far no one on either side had suggested an alternative. He himself had made suggestions for overcoming the difficulty, but so far there had been no response from the two parties concerned. He warned that the time may come when he would have to take his own line and do the best he could with it. Mr. Evershed remarked that he would be very interested in the work the committee will perform in the matter of fuel efficiency. He welcomed the spirit of this committee, and said that the members were contributing to the needs of the nation as well as their own needs. He had no doubt that this committee would trap the black sheep who are letting down the side. The amount of fuel which would be allowed to the industries would be restricted, so if there were any extravagant users, everyone would tend to suffer. Everyone present would be interested in seeing that each member of their industry would do his part in procuring the maximum economy and efficiency. He was speaking for matters of economy as well as matters of production, and assured the foundries that if his department was kept well informed of the steps being taken as well as what was being produced, his department could be very helpful. In this manner the foundries would be serving themselves as well as his office.

Quality of Coal

Referring to Mr. Evans' query regarding the quality of coal now being supplied, Mr. Evershed felt that in many industries such complaints were always made when people had to take something to which they were not accustomed. One must realise, he continued, that transport was a very important consideration when dealing with the distribution of coal. Industrialists might not always be able to get exactly what they want, or what they had been used to, and there was also the necessity of trying to make use of qualities that ordinarily would not be in substantial demand, and it was an important matter to see to what extent that fuel can be used, so that the deep mine coal can be stocked for a rainy day. He had no doubts that there was some truth in the allegation that some deterioration of quality does happen, but it was also true that within certain limits, such as shortage of labour for screening, there should be no real excuse for it. He said that he could not do anything about it in a general way, but invited the people who found the quality of their fuel substantially deteriorated to inform his office, naming the origin of supply, so that he might ensure that if it was not justifiable, the supply of such coal would not be repeated. This was a matter, Mr. Evershed added, about which he would like to have specific information, and everyone could dismiss the suggestion that the deterioration was due to a desire to secure higher profit.

Author's Reply

MR. MCRAE SMITH said actually he had intended to say much more about the necessity for varying the

height of the coke bed according to the conditions prevailing and to the design of any particular cupola being used in any individual foundry. He expressed thorough agreement with Mr. Russell that there was an optimum depth of bed for each individual cupola, but that this would vary very considerably with the type of metal being charged. In starting up a new cupola or endeavouring to improve the operation of an existing cupola he would always start with a height of coke bed 36 in. above the centre line of the main row of tuyeres and then gradually reduce or increase this depending on the temperature of the metal obtained from the first tapping. He was in agreement with Mr. Russell about the significance of the time elapsing between the commencement of the blow and the appearance of the first molten metal. With a high coke bed this, of course, would be longer than with a low coke bed, but the main point was to ensure that this time was constant and regular during the operation of any one cupola.

Regarding Mr. S. H. Russell's question about the difference in performance of a cupola melting for medium weight castings, as compared with a cupola melting for light castings, he thought that if every condition was the same irrespective of the size of the moulds being poured, these two cupolas could be made to melt at the same rate. However, there was a tendency for cupola operators to retard the melting rate if conditions were such that the metal was not being got away as quickly as the cupola was capable of melting it.

He endorsed most enthusiastically Mr. Russell's comments about the use of cupola lighting torches. Apparently the particular form of torch designed by Mr. Russell was very effective and he was glad to know that particulars would be made available for the foundry industry generally. He also agreed that the use of such appliances could bring about a very considerable saving in fuel, not only for lighting bed coke in the cupola, but also for ladle drying and preheating.

Replying to Mr. Lawrie, he stated he would deal with his question concerning the measurement of the volume of air supplied to the cupola first, as it had some bearing on the remarks made by Mr. Russell. He entirely agreed that the measurement of the volume of air supplied was very important, but would again emphasise that, for any ordinary foundry, if the melting rate was checked and this was found to be satisfactory, then it was almost certain that the volume of air, pressure of air and other conditions appertaining to air supply were reasonably correct. He added that where such instruments were installed they must be kept in a highly efficient condition and that there were also some foundries where the operatives did not know or had not been instructed how to make proper use of them.

Drying Stoves

With regard to Mr. Lawrie's second question about the size of the well compared with the class of metal being produced, obviously it was better from the compositional aspect if the well was large enough to hold the molten metal from at least two complete charges. However, a great deal could be done to achieve regularity of composition if the weight of individual charges is controlled according to the capacity of the cupola. In his experience Mr. McRae Smith considered that far too many founders used too heavy a charge on their cupolas. This usually resulted in low tapping temperatures and irregularity of composition. He was very surprised to hear Mr. Lawrie's statement that he had recently encountered modern mould drying stoves where no provision had been made for outlet flues. He would not have thought it possible for manufacturers of modern stoves to agree to such a system, but in many cases the old type of manger-fired stoves either did not have any flues at all or those provided were very inadequate. As had been so very frequently pointed out recently, the application of heat alone would not dry wet sand and sufficient hot air must be circulated in the stove to obtain efficient and economical drying.

Mr. McRae Smith was in agreement with Mr. Lawrie's remarks regarding dry-sand *versus* green-sand moulding, particularly for the production of complicated castings, since a green-sand moulder has to be a highly skilled craftsman. He had not mentioned the various types of materials normally used for ladle linings, but he was always in favour of a refractory brick lining rather than a loam-sand lining.

With regard to the use of coke ashes and cinders instead of new coke for venting purposes, Mr. McRae Smith considered that ashes and cinders were the only materials which should be allowed and on no account should anyone use new coke which could be used as fuel. There were, of course, other non-combustible materials which might also be considered for this application.

Use of Recirculated Air

Replying to Mr. P. A. Russell's question about the use of recirculated air in mould and core drying stoves, Mr. McRae Smith said that this was simply a question of making use of the hot air which had once passed through the stove. There was a number of designs of stoves on the market making use of this principle which prevented the escape of air through the flue stack at too high a temperature. Regarding Mr. P. A. Russell's last question about the control of the cupola during the last part of any particular melt, he felt that this was a very difficult problem and he was afraid he could not be very helpful. He would suggest, however, that he did not consider it wise for the furnacemen to continue blowing until all the metal had been melted. He should shut off the air blast when there was still a little unmelted metal left. This would ensure that there was no excessive wastage of the residual coke in the bed.

Another point related to this was that a great many foundries, when they have dropped the cupola bottom, simply spray a little water on and leave it at that, so that much coke is burnt away and lost. If this coke is to be saved it is essential that it should be thoroughly quenched.

American Metallurgical Scene—13

IMPORTANCE OF SEGREGATING ALUMINIUM SCRAP

Carl H. Burton, chief officer, Reclamation and Inventory Branch, Aluminium and Magnesium Division of the W.P.B., speaking recently before the National Association of Waste Material Dealers, Inc., emphasised the necessity for careful segregation of aluminium scrap. While the first efforts towards segregation were started on a voluntary basis, he said the goal was so important as to justify the issue of a Government order in January, 1942, which had undergone many amendments since. Slightly over a year ago, before the general segregation effort began, probably not over 35 per cent. of the aluminium scrap generated in America was segregated. To-day, records indicate that more than 85 per cent. is segregated. This has been accomplished over the same period in which the amount of scrap generated has more than doubled, and the number of companies using aluminium has increased greatly.

To-day, the industry is furnishing directly to the war effort, in ingot derived from scrap each month, more aluminium than the entire aluminium industry produced each month in the United States three years ago. Just 85 per cent. segregation means that America's entire aluminium supply of three years ago has been doubled simply by proper salvage of scrap. On the old basis of segregating but 35 per cent., the war effort would have suffered to the extent of several hundred million pounds of aluminium. It should also be remembered that European production of new aluminium results in a purity of metal of about 99.6 per cent. on the average; whereas, in America the average is about 99.75 per cent. This extra purity enables aircraft aluminium alloys to be produced with a tensile strength abont 5 per cent. over that possible from the lower purity metal, which means an increased load-carrying capacity, whether of freight or bombs. The effect of that extra 0.15 per cent. of impurities in virgin metal also applies to secondary metal.

Since scrap and its recovery are so important in the war programme, it has been necessary in America to place rigid restrictions on the uses and channels through which aluminium scrap would be permitted to move. This was done solely because, with a metal in such rapidly increasing demand and in such limited supply, it became positively essential that every pound should be put to the best use; and every pound should be made available in the highest grade possible.

Proper segregation must start at the machine, where the scrap is generated, and from that point on the segregation, once made, must be retained by placing the scrap into containers marked for the exclusive alloy they are to carry. When these containers are moved from the machine to the storage bin, they must be dumped only into the bin marked for that alloy. When the bins are emptied, the segregation of alloys must be retained and each alloy be so clearly marked as to eliminate any guess work. Storage facilities must be prepared to retain the identity of the alloy.

In cases where borings and turnings are produced, it is essential that the machine operator knows what alloy he is working on. This should be an integral part of his instructions on the job. When the operator changes from one alloy to a run on another, his machine, and the floor around it, must be cleaned thoroughly, the tags on his machine changed to the new alloy, and fresh, properly marked containers made available for the new scrap.

Because certain castings containing inserts of other metals are machined, it is realised that segregation cannot be effected 100 per cent. However, if a routine is followed, the amount of mixed plant scrap can be held to a minimum.

The regular flow of obsolescent scrap is also of great importance. Such scrap, from its very nature, cannot of course be segregated. Since it is made up of a great variety of products produced from aluminium of every known (and many unknown) combination of ingredients, that flow of obsolescent scrap serves to provide a good portion of the metal required for the deoxidisation of steel. Without that supply, it would be necessary to divert a similar amount of higher grade scrap from other, urgently-needed direct war uses.

WAR PLANT EXPANSION

Since the United States entered the war the Reconstruction Finance Corporation and its subsidiaries have financed or contracted to finance the construction, equipping or expansion of 1,337 plants for the production of ships and planes, tanks, heavy guns, ordnance, magnesium, aluminium, steel, tin, copper and other metals; synthetic rubber, high octane petrol, machine tools, pipelines and other products essential to the war effort. Since its creation in 1940 the Metals Reserve Company (R.F.C. subsidiary) has made commitments of $3,225,000,000 with the object of stocking strategic and critical metals and materials. Last June the Metals Reserve Company agreed with War Supplies, Limited, a company set up by the Canadian Government, to advance a total of $10,000,000 to be used for the development in Canada of new sources of supply of copper, lead, zinc and other strategic and critical materials.

Commitments have been made for the construction of 144 new steel plants of various sizes and the installation of equipment in twenty-nine existing plants. These plants will be operated under lease by eight-three different privately owned companies. Among foreign activities of Defense Plant Corporation are included the establishment of facilities at a cost of $19,300,000 for the production of nickel in Cuba and at an estimated cost of $19,999,850 for the production of copper in Chile.

Reporting on foundry progress in 1942 in "Steel," R. L. COLLIER, of the Steel Founders' Society of America, calls attention to the increasing use of banks of infra-red lamps for the rapid drying of dry-sand moulds.

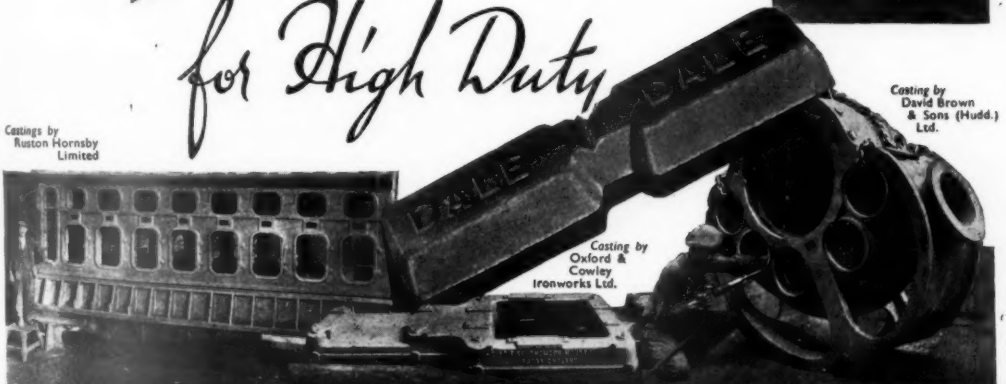
STANTON DALE

Refined PIG IRON for High Duty

Castings by Morris Motors Limited.

Casting by Baker Perkins Limited

Castings by Ruston Hornsby Limited



Castings by Ruston Hornsby Limited

Casting by David Brown & Sons (Hudd.) Ltd.

Casting by Oxford & Cowley Ironworks Ltd.

THE STANTON IRONWORKS COMPANY LIMITED
NEAR NOTTINGHAM.

VITREOUS ENAMELLING IN THE UNITED STATES

R. A. WEAVER, President, Ferro Enamel Corporation, Cleveland, in a progress report for 1942 to "Steel," writes that the war gave the porcelain enamelling industry a severe jolt. All in the industry realised in advance that business would be curtailed, but from experience in Great Britain, Canada, and elsewhere, they had no idea that their business would be eliminated. Actually, last year the industry was quite hopeful that they could substitute porcelain enamel on steel, cast iron, etc., for more strategic materials such as aluminium, stainless steel, and the like, but the industry soon discovered that although it had the porcelain enamel, it could not get the steel. The outstanding achievement of the industry during the last year was the conversion of enamelling furnaces to heat-treating of various sorts. The industry made a real contribution to the war effort and found their experience in handling and controlling high temperatures gave them a big advantage in their new efforts. Practically all the porcelain enamelling shops in America are either closed down or working at a very small percentage of their former volume. Some reflectors are still being made, and some items like coffee urns, steam tables, trays, canteens, aeroplane exhaust manifolds and stacks are being finished in porcelain enamel, but this meant the substitution of steel for other more critical materials in most cases.

RECOMMENDED PROCEDURE FOR THE IMPACT TEST FOR CAST IRON

(*Concluded from page* 240.)

of any difficulty an approach should be made to W. & T. Avery, Limited, Soho Foundry, Birmingham, 40, who have co-operated with the Sub-Committee in their experimental work and who will be glad to assist in the provision of such equipment.

All firms concerned with the impact testing of cast iron and who are already using a test of the type described above, or who contemplate making the necessary arrangements to carry out such a test, are asked to co-operate with the Sub-Committee during the present period of investigation prior to the ultimate standardisation of the test. In this connection they should communicate with the Secretary of the Sub-Committee, Dr. A. B. Everest, c/o The Mond Nickel Company, Limited, Grosvenor House, Park Lane, London, W.1. Arrangements will be made within limits to supply firms co-operating in this test with standard material for check test purposes during the development period.

Canadian Car & Foundry Company has sufficient orders on hand to keep it employed at the present rate of production until the middle of 1944, and approximately 95 per cent. of these are war orders, stated the president at the recent annual meeting.

POST-WAR CONTROL OF COMMODITIES

Mr. John Brown (general secretary), speaking at the recent annual conference of the South Wales Division of the Iron and Steel Trades Confederation at Neath, moved on behalf of the Executive Council a composite motion recommending the continuance after the war of commodity controls, rationing and stabilised prices, an extension of the Essential Work Order to cover all industrial wage earners, and the establishment of a minimum wage.

He said there would be agitation by powerful commercial interests for the relaxation of wartime restrictions. The continuance of some controls might be necessary long after the end of the war. It would be fatal if there was an immediate return to the ordinary machinery of supply and demand, as was done after the last war with disastrous results. The policy of price stabilisation must be continued if everyone was to have an equal chance of securing a fair share of available commodities.

The motion was adopted, as also were further motions calling for the transfer of the iron and steel industry from private control to ownership by a public corporation; urging the adoption of income-tax on current wages; and legislation to secure the implementation of the main recommendations of the Beveridge Report during the lifetime of the present Government.

It was announced that United States steelworkers had offered £18,000 to the steelworkers of Britain to secure and equip a convalescent home. Members of the confederation and the blast furnacemen's union had accepted the responsibility for the maintenance of the home when it was established.

NON-FERROUS SCRAP ACCUMULATIONS

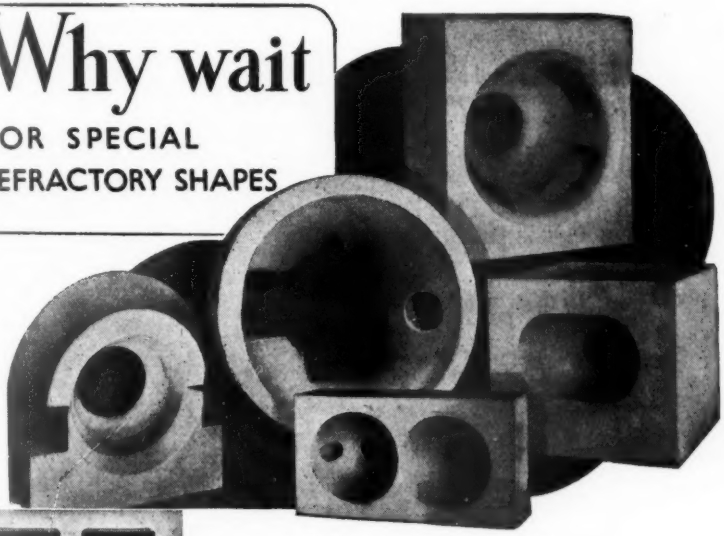
MR. LOVERSEED asked the Minister of Supply in the House of Commons recently if steps had been taken "to prevent the dumping, for use after the war, of turnings and residues containing high percentages of tin and copper," by firms engaged on machining work on non-ferrous materials.

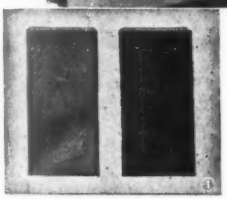
SIR ANDREW DUNCAN replied that the Ministry of Supply was in close touch with the main consumers of non-ferrous metals, and ensured, when releasing virgin metals, that full use was made of any scrap available. He had no reason to suppose that there was any undue accumulation of scrap by machinists, but if Mr. Loverseed had any particular case in mind he would make inquiries.

Southern Rhodesia's mineral production in 1942 was the highest in the Colony's history, with a total value of £9,377,166, an increase of £478,106 over 1941. This increase was wholly due to the increase in base mineral production.

Why wait

FOR SPECIAL
REFRACTORY SHAPES





NO SHRINKAGE. Illustration (1) shows two blocks cast in moulds and dried at atmospheric temperature. One was fired to 1500° C for four hours. Specimens are the same size.

STRENGTH. Illustration (2) shows two test pieces cast in moulds, dried at atmospheric temperature and one heated to 1000° C. Tensile strength —*Unfired*, 550 lbs. per sq. in. *Fired*, 1312 lbs. per sq. in.

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ACID - PROOF MATERIALS
CEMENTS . PLASTICS
INSULATION . SILICA BRICKS
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with DURAX No. 2

REFRACTORY CONCRETE

IN CASES of emergency, special shapes and replacements may be made quickly with Durax No. 2 Refractory Concrete. Mixed similarly to ordinary building concrete, Durax is poured into position, dries quickly and sets to a remarkable degree of hardness. There is no permanent volume change and tests have shown no signs of fusion below 1580° C—there is no tendency to crack or spall. Durax No. 2 is used for protection of header tubes and drums in water tube boilers, access door and lid linings, flame baffles, burner blocks, furnace and coke oven door linings, complete monolithic linings, small monolithic arches and all types of special shapes.

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GENEFAX HOUSE SHEFFIELD, 10, ENGLAND.
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33

PERSONAL

MR. CLIFFORD HUMPHREYS has been appointed a director of the Blaenavon Company, Limited.

MR. REGINALD WOODS has been appointed managing director of the General Cable Manufacturing Company, Limited, Leatherhead.

MR. C. E. WESTOVER, executive vice-president (managing director) of the American Foundrymen's Association, has resigned and returned to industrial employment.

MR. J. PARTON has been appointed general manager of the Whitehead Thomas Bar & Strip Company, Limited, Scunthorpe, on the retirement of Mr. A. G. Brown. Mr. Parton was previously mill manager.

MR. JOHN SWAIN, chairman and managing director of Matthew Swain, Limited, ironfounders and cast-iron hollow-ware manufacturers, Newton Heath, Manchester, has completed 50 years with the firm and has received a presentation from the employees to mark the occasion.

MR. HERBERT G. WHEALE has received a presentation from his colleagues to commemorate 50 years of service with the Firth companies, Sheffield. Mr. Wheale joined the staff of Thos. Firth & Sons, Limited, in June, 1893, and is now the chief cost clerk of Firth-Vickers Stainless Steels, Limited.

MR. F. W. CASHMORE, chairman of John Cashmore, Limited, plant and machinery merchants, of Great Bridge, West Bromwich, and Newport, Mon, has received presentations from the directors and staff at the Great Bridge works and the workmen there, and the older members of the staff at Newport, on the occasion of his 60th birthday.

MR. CHARLES H. CRABTREE, Regional Controller of the Ministry of Production for the East and West Ridings of Yorkshire, has resigned. Mr. Crabtree, who was appointed Regional Production Controller on June 30 last year, is chairman and managing director of R. W. Crabtree & Sons, Limited, printing machine makers, of Leeds, with which firm he has been associated since 1895. He is also chairman of John Fowler & Company (Leeds), Limited.

DR. GEORGE LESLIE KELLEY, managing director of the Pressed Steel Company, Limited, Cowley, has been made an honorary M.A. of Oxford University. Dr. Kelley recently earned the gratitude of the University by finding the solution of certain difficult problems connected with the ventilation and heating of the Bodleian Library. A student of Harvard, where he became lecturer in chemistry, and of which university he was a Ph.D., Dr. Kelley went over to research work on the metallurgical side of the steel industry. He came to Oxford as general manager of the Pressed Steel Company, and was appointed managing director about a year ago.

MR. G. E. BAILEY, C.B.E., works director of the Metropolitan-Vickers Electrical Company, Limited, was recently presented by the Management Board of the Engineering and Allied Employers' National Federation with an engraved silver tray in recognition of his excellent work for the Federation since 1921. After acting as vice-president for a number of years, Mr. Bailey was elected president of the Federation in May, 1940, succeeding Sir Charles Craven, and he served in that capacity until February, 1943. To mark their appreciation of his work on their behalf the General Council appointed Mr. Bailey a trustee of the Federation, thus enabling them to retain the benefit of his wide knowledge of engineering problems. Mr. Bailey has served on a large number of Federation committees covering a wide range of subjects. He is an outstanding figure on a number of Government committees and panels. The Management Board of the Federation has also made a presentation to Mrs. Bailey.

NEWS IN BRIEF

JOHN HASTIE & CO., LTD., of Greenock, have been granted a license to manufacture Meehanite castings.

THE FEDERATION OF CHAMBERS OF COMMERCE of the British Empire has re-elected Lord Dudley as president, and Sir Arthur Aiton, Sir Bernard Sugden, and Sir Thomas Smith as chairman of the council, deputy chairman, and treasurer respectively.

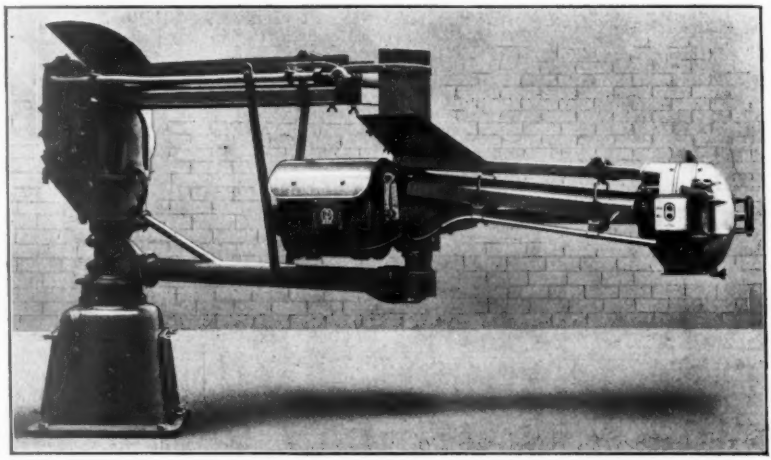
WHOLESALE PRICES, as measured by the Board of Trade index number, showed a slight fall (0.1 per cent.) in June as compared with May, food prices falling by 0.5 per cent. and industrial materials and manufactures rising by 0.2 per cent.

THE COUNTESS OF DUDLEY, opening a canteen at the Round Oak Steel Works at Brierley Hill recently, served the first meal to Mr. E. Wilcox, who had been employed at Round Oak for about 50 years. The Earl of Dudley, chairman of the company, said that although canteens might be foreign to the Black Country workers and home might be the proper place for meals, they had become a wartime necessity, and made not only for economy, but for efficiency.

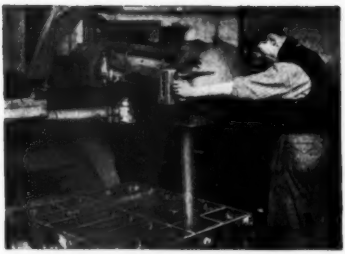
CERTIFICATES and monetary gifts for long service to 154 employees were presented at a social gathering at Bayliss, Jones & Bayliss, Limited, Wolverhampton, recently. The presentations included one to Mr. Edward Sutton, who has put in 60 years' service and who has known four generations of the firm. Among those who received certificates for 30 years' service was Mr. Fred Bayliss, and his elder brother, Mr. Percy Bayliss, another director, was the first of 46 to receive certificates for 40 years' service.

AT A MEETING last week of the Cumberland Iron Ore Miners' Branch of the National Union of General and Municipal Workers, it was decided to place the following proposals upon the agenda for the annual meeting of the Conciliation Board: (1) A claim for £1 additional payment for the week's holiday period; (2) claim for 2s. per shift over and above bargain rates for abnormal and wet workings; (3) a review of overtime rates which will ensure that the industry shall be on an equal footing in this respect with other established industries; (4) payment to certain workers for week-end work at the Hodbarrow Mine. Mr. R. Graham, of Egremont, was elected chairman of the Branch.

Powerful electric ramming for all classes of foundries



Sandslinger designs are available for iron, steel, non-ferrous and light alloy foundries



High sand capacity and suitable radius arm can be supplied to meet special or mass production conditions

FOUNDRY PLANT & MACHINERY LTD. 113 W. REGENT ST., GLASGOW

COMPANY NEWS

(Figures for previous year in brackets.)

Newton Bros.—Dividend of 17½% (15%).

Engineering Components—Interim dividend of 10% (same).

Ward & Goldstone—Final dividend of 10%, making 20% (same).

Metal Box—Final ordinary dividend of 10%, plus a bonus of 2½%, making 17½% (same).

George Kent—Final dividend of 7% and a bonus of 2½%, making 12½% (same).

Harland & Wolff—Dividend of 6% on the "A" ordinary and "B" ordinary shares (same).

Banister Walton—Profit to March 31, after tax and N.D.C., £21,056 (£22,082); dividend of 20% (same); to reserve, £10,000 (same); forward, £12,190 (£13,398).

Henry Hope & Sons—Profit for year to April 3 last, after income-tax and N.D.C., £79,810 (£55,143); dividend on the ordinary stock of 10% (5%); to war contingencies reserve, £5,000; to reserve, £25,000; forward, £30,888 (£29,290).

Christy Bros. & Company—Profit for the year to March 31 last, £58,872; dividends on investments, £19,793; provision for taxation, £32,140; to general reserve, £10,000; dividend of 12½% on the ordinary stock (same); forward, £19,312 (£25,759).

West's Gas Improvement Company—Profit for the year ended March 31 last, after providing for taxation, £9,957; dividends of 6% on the cumulative preference shares, 10% on the participating preference shares, and 10% on the ordinary shares; forward, £27,867.

A.B.C. Coupler & Engineering—Net profit to September 30 last, after tax and contingencies, etc., £6,590 (£5,767); 6½% preference dividend, less tax, £1,454 (£1,541); ordinary dividend of 10% (same), £1,027 (£1,055); to reserve, £4,000 (£3,000); forward, £1,598 (£1,489).

Coghlan Steel & Iron—Net profit for the year ended March 31, after providing for depreciation and taxation, etc., £9,171 (£6,132); dividend on the ordinary shares of 12½% (10%), less tax, £3,125; to reserve, £1,000; forward, after preference dividend payments, £12,481 (£9,373).

Thomas Bolton & Sons—Net profit, £197,848 (£129,054); reserve for income-tax on 1942-43 profits, £128,077 (£92,469); to reserve, £30,000 (nil); war contingencies, £20,000 (£10,000); ordinary dividend of 7½% (same), and a cash bonus of 2½% (nil); forward, £65,428 (£76,157).

Mirrlees, Bickerton & Day—Net profit for the year ended March 31, after providing for depreciation, E.P.T. and income-tax, £26,186 (£18,784); war insurance on fixed assets, £2,377; preference dividend, £1,952; dividend of 8% (6%) on the ordinary shares; forward, £10,479 (£7,262).

Harland Engineering—Profit for 1942, after providing for depreciation, taxation, deferred repairs, etc., £15,432 (£16,250); general reserve, £7,000; War Damage Act contributions, £1,207; A.R.P., £600; preference dividends, £3,000; dividend on the ordinary shares of 5% (4%), £3,500 (£2,800); forward, £14,312 (£14,188).

NEW PATENTS

The following list of Patent Specifications accepted has been taken from the "Official Journal (Patents)." Printed copies of the full Specifications are obtainable from the Patent Office, 25, Southampton Buildings, London, W.C.2, price 1s. each.

553,827 LISTER & COMPANY, LIMITED, R. A., and WERRETT, R. Electrodeposition of metals.

553,871 BONNEY, A. S., and ADLAM, W. J. Moulds or matrices for use in the formation of metal articles by electro-deposition.

553,876 LATIMER, J., and METROPOLITAN-VICKERS ELECTRICAL COMPANY, LIMITED. Welding of aluminium-iron alloys.

553,882 POKORNY, E. A. Feeding device for rotative furnaces.

553,885 PHILPLUG PRODUCTS, LIMITED, and TAYLOR, C. H. Means for securing rails to sleepers.

553,924 NEWELL & COMPANY, LIMITED, E., and HOWDEN, P. Heating or drying of crushed stone, ore and like materials.

553,982 FAIRWEATHER, H. G. C. (American Cyanamid Company). Process for concentrating ores.

554,046 BRITISH NON-FERROUS METALS RESEARCH ASSOCIATION, LIDDIARD, E. A. G., KENWORTHY, L., and FRAPWELL, S. A. Method of and means for preventing or hindering corrosion of zinc, zinc alloy or zinc coated parts in water systems.

554,113 HYDRO-BLAST CORPORATION. Method and means for treating ferrous objects.

NEW COMPANIES

("Limited" is understood. Figures indicate capital. Names are of directors unless otherwise stated. Information compiled by Jordan & Sons, 116, Chancery Lane, London, W.C.2.)

Wicker Engineering Company, 19, Figtree Lane, Sheffield—£1,000.

T. Longman & Son, Creek Bridge, Iron Wharf, Deptford, London, S.E.—Iron and steel merchants. £15,000. E., F., and W. Ash.

Fareham Components, 37, High Street, Fareham, Hants—Engineers, etc. £1,000. A. F. Hansford, R. B. J. Polden, S. Filleul, A. V. Picton, and J. E. Collins.

A. W. Wickens, 33, Lawrence Lane, London, E.C.2—Founders and engineers, at Horton Bridge Foundry, West Drayton. £1,000. A. W., K. H. and R. G. Wickens.

CONTRACTS OPEN

The date given is the latest on which tenders will be accepted. The address is that from which tender forms may be obtained.

Birkenhead, July 26—E.h.t. metalclad switchgear; 230-kw. glass bulb mercury arc rectifier; l.t. distribution switchgear, for the Town Council. The Borough Electrical Engineer, Craven Street, Birkenhead.

Troon—Construction of extending main outfall concentration cast-iron sewer (under-water work), for the Town Council. The Burgh Surveyor, Municipal Buildings, Troon.

FUNDAMENTALS OF CIVILISATION

No. 1 CLOTHING

THE UNITED STEEL COMPANIES LTD

Textiles and the machines to make them ushered in the industrial revolution. For centuries the wooden spinning wheel, clumsy and laborious, produced homespun for the yeoman and labourer and fine silks and satins for the rich. Modern mechanical engineering was born with the invention of the machines to spin and weave and with the engines required to drive these frames and looms. Tools of steel became necessary to shape and to fashion in quantity these instruments of the great textile industries. Thus grew the art and practice of steel making with its wealth of materials of special quality for making every kind of complex mechanism. Without steel it would not be possible to produce the great variety of woven fabrics now available and essential to the needs of civilised man.

THE UNITED STEEL COMPANIES LIMITED

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WORKINGTON IRON & STEEL CO., WORKINGTON
THE SHEFFIELD COAL CO. LTD.
THE ROTHERVALE COLLIERIES, TREETON
UNITED COKE & CHEMICALS CO. LTD.
THOS. BUTLIN & CO., WELLINGBOROUGH

U.S.P. 25

Raw Material Markets

IRON AND STEEL

Demand for heavy castings remains at peak levels, and makers' order-books are filled over some time to come, with the prospect of additional business coming forward to enable them to maintain uninterrupted operations. These castings are required for aircraft, tank, gun, and a number of other armament contracts. In normal times heavy engineering works use the better-class irons, such as hematite and low-phosphorus qualities, but, owing to the shortage of these grades, it is now necessary for them to make adjustments, and high-phosphorus iron, steel scrap and other substitutes are being used freely. It is hoped that larger imports of the ores necessary for the manufacture of the better grades of iron will soon be forthcoming from African ports.

The position of the light-foundry industry is little changed, and there is a considerable volume of surplus capacity in this section. A number of firms have been able to adapt their plant to the production of heavier castings than those usually turned out, but many works are in need of additional orders, which do not look like materialising until the building industry is again in a position to function normally, as, in peacetime, much of the business of light foundrymen comes from this source.

There is a plentiful supply of coke, and regular deliveries are going through to the foundries from the collieries in South Wales, Durham and elsewhere. Those foundries having stocking accommodation are filling up, and there is sufficient tonnage available for this purpose, in addition to meeting the demands for current consumption.

Orders for heavy joists can still be accepted and executed at short notice, but all other specifications for heavy rolled steel have to be issued well in advance of required delivery dates. The output capacity of the plate mills, in particular, is strained to its limits. Most of the bookings are for the shipyards, but engineers, tank builders and the boiler, wagon and locomotive trades all require substantial quotas, and careful allocation is necessary to ensure that none of these essential trades goes short. There is still a well-sustained demand for light and medium sections, and the recent slackening of the flow of orders for sheets is not an unwelcome development, since the makers have an abundance of work on hand, and are anxious to clear off contracts which have been too long on their books.

NON-FERROUS METALS

While the demand for copper continues to be substantial, there is a tendency for requirements to become rather easier in certain directions. This applies particularly to secondary material, owing to a reduction in the output of brass billets. On the other side of the Atlantic, supplies of the red metal are none too plentiful, and statements that output of munitions will be expanded during the remainder of the year would appear to foreshadow an even stronger demand for copper. As a result of the standardisation and simplification of some 1,000 articles used in households it is estimated that around 17,000 tons of copper will be saved in the United States during 1943.

Preliminary figures issued by the American Bureau of Mines indicate that the total mine production of recoverable copper in the United States, including Alaska, amounted to about 1,072,003 short tons in 1942—a record total and an increase of 12 per cent. over the previous year.

In the United Kingdom only essential users of tin are receiving supplies; in this way tin requirements are being met satisfactorily. For many purposes tin has been superseded by substitute metals, so that consumption has been reduced in many directions. Similar changes are being effected in America. A recent statement by the U.S. War Production Board indicates that about 3,000 tons of tin will be saved this year and 5,000 tons in 1944 by the use of silver-lead solder instead of tin-lead. In the latter there is about a 30-40 per cent. content of tin, whereas in silver-lead solder the tin content is reduced to about 5 per cent.

OBITUARY

MR. WILLIAM HENRY EYLES, who was for more than forty years commercial manager of Sir John Priestman & Company, shipbuilders, Sunderland, has died at the age of 80.

MR. HARRY HALES, head of the firm of H. Hales, Limited, tinplate and metal merchants, of Swansea, died recently, aged 77. He had been associated with the tinplate trade for nearly 60 years.

MR. HARRY CECIL COATSWORTH, managing director of the Wear Winch & Foundry Co., Ltd., Sunderland, a business which he established after the last war, died on Friday last, aged 61. He was also North-East Coast agent for the Consett Iron Co., Ltd., and a director of John Lynn & Co., Ltd., engineers and ironfounders, Sunderland.

DEALING WITH SHIPBUILDING AND SHIPPING, the Truman Committee, investigating the National Defence programme, states that 746 merchant ships, comprising 8,090,800 deadweight tons, were constructed in 1942, and it is estimated that 20,000,000 deadweight tons can be constructed in 1943, if materials and supplies are made available.

THE MINISTER OF SUPPLY has issued the Control of Talc and Pyrophyllite (No. 1) Order, 1943, to take effect from July 19. The Order makes it necessary, except for quantities not exceeding 7 lbs., to obtain licences for the disposal and acquisition of talc or french chalk, steatite, soapstone and pyrophyllite. Inquiries should be addressed to the Chrome Ore, Magnesite and Wolfram Control, Broadway Court, Broadway, Westminster, London, S.W.1.

TRADE SIROCCO MARK

FANS for FOUNDRIES

THE comparatively high pressures which are necessary in connection with the supply of air blast to forges and cupolas, or work of a similar character, requires the employment of a Fan possessing an exceptionally high standard of performance and operating efficiency. Such strenuous demands are adequately fulfilled by

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which are soundly constructed to give hard and continuous service with a minimum of attention. "Sirocco" Fans are manufactured in four different types, i.e., Cast-Iron High-Pressure, Single Inlet Cupola, Double Inlet Cupola, and Narrow-Pressure Fans.

Publication Ref. No. SF26, describing "Sirocco" H.P. Fans, is available on request.

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All Enquiries should be addressed to: Industrial Specialities, Dept. 34.

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Temporary Telephone: Kelvin 3871-2-3-4-5
Telegrams: "Sternoline, Phone, London"

CURRENT PRICES OF IRON, STEEL AND NON-FERROUS METALS

(Delivered, unless otherwise stated)

Wednesday, July 21, 1943

PIG-IRON

Foundry Iron.—CLEVELAND No. 3: Middlesbrough, 128s.; Birmingham, 130s.; Falkirk, 128s.; Glasgow, 131s.; Manchester, 133s. DERBYSHIRE No. 3: Birmingham, 130s.; Manchester, 133s.; Sheffield, 127s. 6d. NORTHANTS No. 3: Birmingham, 127s. 6d.; Manchester, 131s. 6d. STAFFS No. 3: Birmingham, 130s.; Manchester, 133s. LINCOLNSHIRE No. 3: Sheffield, 127s. 6d.; Birmingham, 130s.

(*No. 1 foundry 3s. above No. 3. No. 4 forge 1s. below No. 3 for foundries, 3s. below for ironworks.*)

Hematite.—No. 1 (S & P 0.03 to 0.05 per cent.): Scotland, N.-E. Coast and West Coast of England, 138s. 6d.; Sheffield, 144s.; Birmingham, 150s.; Wales (Welsh iron), 134s. East Coast No. 3 at Birmingham, 149s.

Low-phosphorus Iron.—Over 0.10 to 0.75 per cent. P, 140s. 6d., delivered Birmingham.

Scotch Iron.—No. 3 foundry, 124s. 9d.; No. 1 foundry 127s. 3d., d/d Grangemouth.

Cylinder and Refined Irons.—North Zone, 174s.; South Zone, 176s. 6d.

Refined Malleable.—North Zone, 184s.; South Zone, 186s. 6d.

Cold Blast.—South Staffs, 227s. 6d.

(NOTE.—*Prices of hematite pig-iron, and of foundry and forge iron with a phosphoric content of not less than 0.75 per cent., are subject to a rebate of 5s. per ton.*)

FERRO-ALLOYS

(Per ton unless otherwise stated, basis 2-ton lots, d/d Sheffield works.)

Ferro-silicon (5-ton) lots.—25 per cent., £21 5s.; 45 per cent., £23 10s.; 75 per cent., £36 10s.

Ferro-vanadium.—35/50 per cent., 15s. 6d. per lb. of V.

Ferro-molybdenum.—70/75 per cent., carbon-free, 6s. per lb. of Mo.

Ferro-titanium.—20/25 per cent., carbon-free, 1s. 3½d. lb.

Ferro-tungsten.—80/85 per cent., 9s. 8d. lb.

Tungsten Metal Powder.—98/99 per cent., 9s. 9½d. lb.

Ferro-chrome.—4/6 per cent. C, £44; max. 2 per cent. C, 1s. 0½d. lb.; max. 1 per cent. C, 1s. 1½d. lb.; max. 0.5 per cent. C, 1s. 1½d. lb.

Cobalt.—98/99 per cent., 8s. 9d. lb.

Metallic Chromium.—96/98 per cent., 4s. 5d. lb.

Ferro-manganese.—78/98 per cent., £18 10s.

Metallic Manganese.—94/96 per cent., carb.-free, 1s. 9d. lb.

SEMI-FINISHED STEEL

Re-rolling Billets, Blooms and Slabs.—BASIC: Soft, u.t., 100-ton lots, £12 5s.; tested, up to 0.25 per cent. C, £12 10s.; hard (0.42 to 0.60 per cent. C), £13 17s. 6d.; silico-manganese, £17 5s.; free-cutting, £14 10s. SIEMENS MARTIN ACID: Up to 0.25 per cent. C, £15 15s.; case-hardening, £16 12s. 6d.; silico-manganese, £17 5s.

Billets, Blooms and Slabs for Forging and Stamping.—Basic, soft, up to 0.25 per cent. C, £13 17s. 6d.; basic hard, 0.42 to 0.60 per cent. C, £14 10s. 6d.; acid, up to 0.25 per cent. C, £16 5s.

Sheet and Tinplate Bars.—£12 2s. 6d., 6-ton lots.

FINISHED STEEL

[*A rebate of 15s. per ton for steel bars, sections, plates, joists and hoops is obtainable in the home trade under certain conditions.*]

Plates and Sections.—Plates, ship (N.-E. Coast), £16 3s.; boiler plates (N.-E. Coast), £17 0s. 6d.; chequer plates (N.-E. Coast), £17 13s.; angles, over 4 un. ins., £15 8s.; tees, over 4 un. ins., £16 8s.; joists, 3 in. × 3 in. and up, £15 8s.

Bars, Sheets, etc.—Rounds and squares, 3 in. to 5½ in., £16 18s.; rounds, under 3 in. to ⅜ in. (untested), £17 12s.; flats, over 5 in. wide, £15 13s.; flats, 5 in. wide and under, £17 12s.; rails, heavy, f.o.t., £14 10s. 6d.; hoops, £18 7s.; black sheets, 24 g. (4-ton lots), £22 15s.; galvanised corrugated sheets (4-ton lots), £26 2s. 6d.; galvanised fencing wire, 8g. plain, £26 17s. 6d.

Tinplates.—I.C. cokes, 20 × 14 per box, 29s. 9d., f.o.t. makers' works, 30s. 9d., f.o.b.; C.W., 20×14, 27s. 9d., f.o.t., 28s. 6d., f.o.b.

NON-FERROUS METALS

Copper.—Electrolytic, £62, high-grade fire-refined, £61 10s.; fire-refined of not less than 99.7 per cent., £61; ditto, 99.2 per cent., £60 10s.; black hot-rolled wire rods, £65 10s.

Tin.—99 to under 99.75 per cent., £275; 99.75 to under 99.9 per cent., £276 10s.; min. 99.9 per cent., £278 10s.

Spelter.—G.O.B. (foreign) (duty paid), £25 15s.; ditto (domestic), £26 10s.; "Prime Western," £26 10s.; refined and electrolytic, £27 5s.; not less than 99.99 per cent., £28 15s.

Lead.—Good soft pig-lead (foreign) (duty paid), £25; ditto (Empire and domestic), £25; English, £26 10s.

Zinc Sheets, etc.—Sheets, 10g. and thicker, ex works, £37 12s. 6d.; rolled zinc (boiler plates), ex works, £35 12s. 6d., zinc oxide (Red Seal), d/d buyers' premises, £30 10s.

Other Metals.—Aluminium, ingots, £110; antimony, English, 99 per cent., £120; quicksilver, ex warehouse, £68 10s. to £69 15s.; nickel, £190 to £195.

Brass.—Solid-drawn tubes, 14d. per lb.; brazed tubes, 16d.; rods, drawn, 11½d.; rods, extruded or rolled, 9d.; sheets to 10 w.g., 10½d.; wire, 10½d.; rolled metal, 10½d.; yellow metal rods, 9d.

Copper Tubes, etc.—Solid-drawn tubes, 15½d. per lb.; brazed tubes, 15½d.; wire, 10d.

Phosphor Bronze.—Strip, 13½d. per lb.; sheets to 10 w.g., 14½d.; wire, 16d.; rods, 16d.; tubes, 21½d.; castings, 19d., delivery 3 cwt. free. 10 per cent. phos. cop. £35 above B.S.; 15 per cent. phos. cop. £43 above B.S.; phosphor tin (5 per cent.) £40 above price of English ingots. (C. CLIFFORD & SON, LIMITED.)

Nickel Silver, etc.—Ingots for raising, 10d. to 1s. 4d. per lb.; rolled to 9 in. wide, 1s. 4d. to 1s. 10d.; to 12 in. wide, 1s. 4½d. to 1s. 10½d.; to 15 in. wide, 1s. 4½d. to 1s. 10½d.; to 18 in. wide, 1s. 5d. to 1s. 11d.; to 21 in. wide, 1s. 5½d. to 1s. 11½d.; to 25 in. wide, 1s. 6d. to 2s. Ingots for spoons and forks, 10d. to 1s. 6½d. Ingots rolled to spoon size, 1s. 1d. to 1s. 9½d. Wire round, to 10g., 1s. 7½d. to 2s. 2½d., with extras according to gauge. Special 5ths quality turning rods in straight lengths, 1s. 6½d. upwards.

NON-FERROUS SCRAP

Controlled Maximum Prices.—Bright untinned copper wire, in crucible form or in hanks, £57 10s.; No. 1 copper wire, £57; No. 2 copper wire, £55 10s.; copper firebox plates, cut up, £57 10s.; clean untinned copper, cut up, £56 10s., braziery copper, £53 10s.; Q.F. process and shell-case brass, 70/30 quality, free from primers, £49; clean fired 303 S.A. cartridge cases, £47; 70/30 turnings, clean and baled, £43; brass swarf, clean, free from iron and commercially dry, £34 10s.; new brass rod ends, 60/40 quality, £38 10s.; hot stampings and fuse metal, 60/40 quality, £38 10s.; Admiralty gunmetal, 88-10-2, containing not more than ½ per cent. lead or 3 per cent. zinc, or less than 9½ per cent. tin, £74 10s., all per ton ex works.

Returned Process Scrap.—(Issued by the N.F.M.C. as the basis of settlement for returned process scrap, week ended July 17, where buyer and seller have not mutually agree a price; net, per ton, ex-sellers' works, suitably packed):—

Brass.—S.A.A. webbing, £48 10s.; S.A.A. defective cups and cases, £47 10s.; S.A.A. cut-offs and trimmings, £42 10s.; S.A.A. turnings (loose), £37; S.A.A. turnings (baled), £42 10s.; S.A.A. turnings (masticated), £42; Q.F. webbing, £49; defective Q.F. cups and cases, £49; Q.F. cut-offs, £47 10s.; Q.F. turnings, £38; other 70/30 process and manufacturing scrap, £46 10s.; process and manufacturing scrap containing over 62 per cent. and up to 68 per cent. Cu, £43 10s.; ditto, over 58 per cent. to 62 per cent. Cu, £38 10s.; 85/15 gilding metal webbing, £52 10s.; 85/15 gilding defective cups and envelopes before filling, £50 10s.; cap metal webbing, £54 10s.; 90/10 gilding webbing, £53 10s.; 90/10 gilding defective cups and envelopes before filling, £51 10s.

Cupro Nickel.—80/20 cupro-nickel webbing, £75 10s.; 80/20 defective cups and envelopes before filling, £70 10s.

Nickel Silver.—Process and manufacturing scrap: 10 per cent. nickel, £50; 15 per cent. nickel, £56; 18 per cent. nickel, £60; 20 per cent. nickel, £63.

Copper.—Sheet cuttings and webbing, untinned, £54; shell-band plate scrap, £56 10s.; copper turnings, £48.

IRON AND STEEL SCRAP

(*Delivered free to consumers' works. Plus 3¾ per cent. dealers' remuneration. 50 tons and upwards over three months, 2s. 6d. extra.*)

South Wales.—Short heavy steel, not ex. 24-in. lengths, 82s. to 84s. 6d.; heavy machinery cast iron, 87s.; ordinary heavy cast iron, 82s.; cast-iron railway chairs, 87s.; medium cast iron, 78s. 3d.; light cast iron, 73s. 6d.

Middlesbrough.—Short heavy steel, 79s. 9d. to 82s. 3d.; heavy machinery cast iron, 91s. 9d.; ordinary heavy cast iron, 89s. 3d.; cast-iron railway chairs, 89s. 3d.; medium cast iron, 79s. 6d.; light cast iron, 74s. 6d.

Birmingham District.—Short heavy steel, 74s. 9d. to 77s. 3d.; heavy machinery cast iron, 92s. 3d.; ordinary heavy cast iron, 87s. 6d.; cast-iron railway chairs, 87s. 6d.; medium cast iron, 80s. 3d.; light cast iron, 75s. 3d.

Scotland.—Short heavy steel, 79s. 6d. to 82s.; heavy machinery cast iron, 94s. 3d.; ordinary heavy cast iron, 89s. 3d.; cast-iron railway chairs, 94s. 3d.; medium cast iron, 77s. 3d.; light cast iron, 72s. 3d.

(Note.—*For deliveries of cast-iron scrap free to consumers' works in Scotland, the above prices less 3s. per ton, but plus actual cost of transport or 6s. per ton, whichever is the less.*

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NOTICE

Small Advertisements in this section of the Journal are accepted at the *prepaid* rate of 2d. per word in ordinary type and 3d. per word in capitals.

Minimum charge for one insertion 4/-.

Instructions for these advertisements, accompanied by a remittance, are accepted up to FIRST POST WEDNESDAY MORNING for insertion in the current week's issue. All communications to be addressed to the Advertisement Manager, FOUNDRY TRADE JOURNAL, 3, Amersham Road, High Wycombe, Bucks. The Proprietors reserve the right to refuse any advertisement they consider unsuitable.

SITUATIONS VACANT AND WANTED

MOULDER desires Administrative Position; 16 years' experience machine tool and heavy industry requirements; sound knowledge estimating, patternmaking, melting, ladle additions, etc.—Box 946, FOUNDRY TRADE JOURNAL, 3, Amersham Road, High Wycombe.

MANAGER (qualified Metallurgist) required for metallurgical research section of large organisation in London district manufacturing aircraft and other scientific instruments.—State qualifications, experience, and salary required to Box 948, FOUNDRY TRADE JOURNAL, 3, Amersham Road, High Wycombe.

METALLURGIST or Foreman required to take charge of Tropenas Plant in small Steel Foundry; must be fully conversant with cupola and converter; steel castings mixtures subjected to Admiralty test and requirements; permanency.—Box 944, FOUNDRY TRADE JOURNAL, 3, Amersham Road, High Wycombe.

EMPLOYMENT REGISTER.

Correspondence should be addressed to the General Secretary, Institute of British Foundrymen, St. John Street Chambers, Deansgate, Manchester, from whom full particulars can be obtained of this service.

FOUNDRY WORKS MANAGER; 17 years' executive experience, machine tools and internal combustion engines; estimating, costing and organisation; casting of mechanised plants; age 45. (449)

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BABCOCK WATER-TUBE BOILER; 23,000 lbs. evaporation; 200 lbs. w.p. DITTO; approx. evaporation 10,000 lbs.; working pressure 150 lbs.

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LANCASHIRE BOILER; 30 ft. by 8 ft. by 120 lbs. w.p.

Two LANCASHIRE BOILERS; 30 ft. by 8 ft. by 160 lbs. w.p.

Two LANCASHIRE BOILERS; 30 ft. by 9 ft. by 160 lbs. w.p.

NEW PRESSED STEEL SECTIONAL STORAGE TANKS; plates 4-ft. square.

LARGE AND VARIED STOCK GOOD SECONDHAND ROLLED STEEL JOISTS, ANGLES, CHANNELS, ROOF PRINCIPALS, ETC.

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Write for "Albion" Catalogue.

ALBION WORKS, SHEFFIELD.

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FOR SALE.—Six first-class, secondhand, Hexagonal RUMBLING BARRELS; each about 2 ft. 6 in. long by 1 ft. 9 in. across flats; with pulleys for belt drive; roller bearings; mounted on "A" frames; price £15 each.—GEORGE COHEN, SONS & Co., LTD., Wood Lane, London, W.12.

MISCELLANEOUS.

Standard Size Adaptable Moulding Machines, etc.

"Ajax" No. 9 Macdonald Pneumatic Jolter turnover table, 36 in. by 46 in.

Coal and Coke Crusher; 2 ft. 6 in. dia.

Brealey Type Sand Disintegrator.

Macnab 5 ft. 6 in. Sand Mills, Size No. 2, with or without 3/50/400 v. motor.

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Sandblasting Plant; 50 Air Compressors; 500 Electric Motors, Dynamos, etc.

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MISCELLANEOUS

ERECTION . . . .

Yes, we're good at that, of course. But do you know we supply and dismantle, too? We do the whole job. Who wants 57 ft. of 12 in. dia. ¾-in. plate damper, cowl, baseplate; lovely job?—ESERIN (STEEPLEJACKS), LTD., 7, Great Castle Street, W.1. Langham 2914.

MISCELLANEOUS—contd.

WARWILL HAVE CAPACITY for first-class Castings in non-ferrous up to 1 cwt.; small repetition castings preferred; suitable for 16 in. by 12 in. by 4 in. boxes.—WARWILL, LTD., ABERTILLERY.

LARGE ENGINEERING FIRM IN THE MIDLANDS WILL REQUIRE, POST-WAR, APPROXIMATELY 50/60 TONS LIGHT GREY IRON CASTINGS PER WEEK; ALSO WILLING TO CONSIDER PURCHASE, OR CONTROLLING INTEREST IN A MODERN FOUNDRY.—Box 930, FOUNDRY TRADE JOURNAL, 3, Amersham Road, High Wycombe.

A MIDLAND FOUNDRY with a limited capacity becoming available in the near future takes this opportunity of placing it at the disposal of firms requiring Non-Ferrous Castings in manganese bronze, aluminium gunmetals, phosphor bronze, etc. We would therefore welcome all inquiries and are confident that this would be of mutual assistance in the post-war period.—Box 918, FOUNDRY TRADE JOURNAL, 3, Amersham Road, High Wycombe.

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METAL-SPRAYING WORKS has capacity for additional work; prices reasonable.—Telephone: Liberty 1357.

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4' 6" Cupola by Pneulec as new.
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New 4ft. sandmill.

NEW SHOT BLAST CABINET PLANTS with motor driven Exhaust Fans, complete, all sizes; air compressors to suit in stock, also motors if required.

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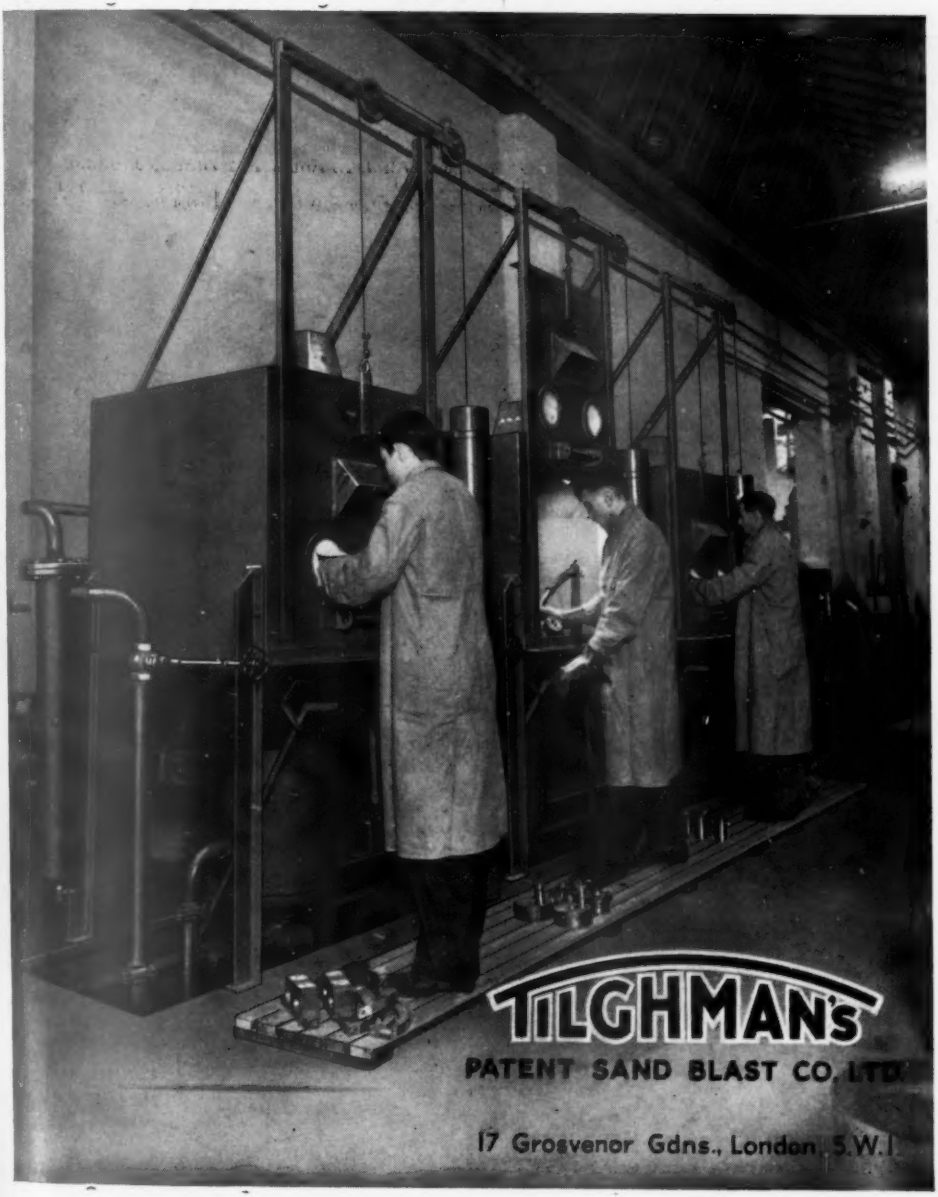
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PATENT SAND BLAST CO. LTD.
17 Grosvenor Gdns., London, S.W.1

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